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Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 246. 97th Year. LONDON, AUGUST 15, 1945. Registered as a Newspaper. No. 4291. Price 1/-

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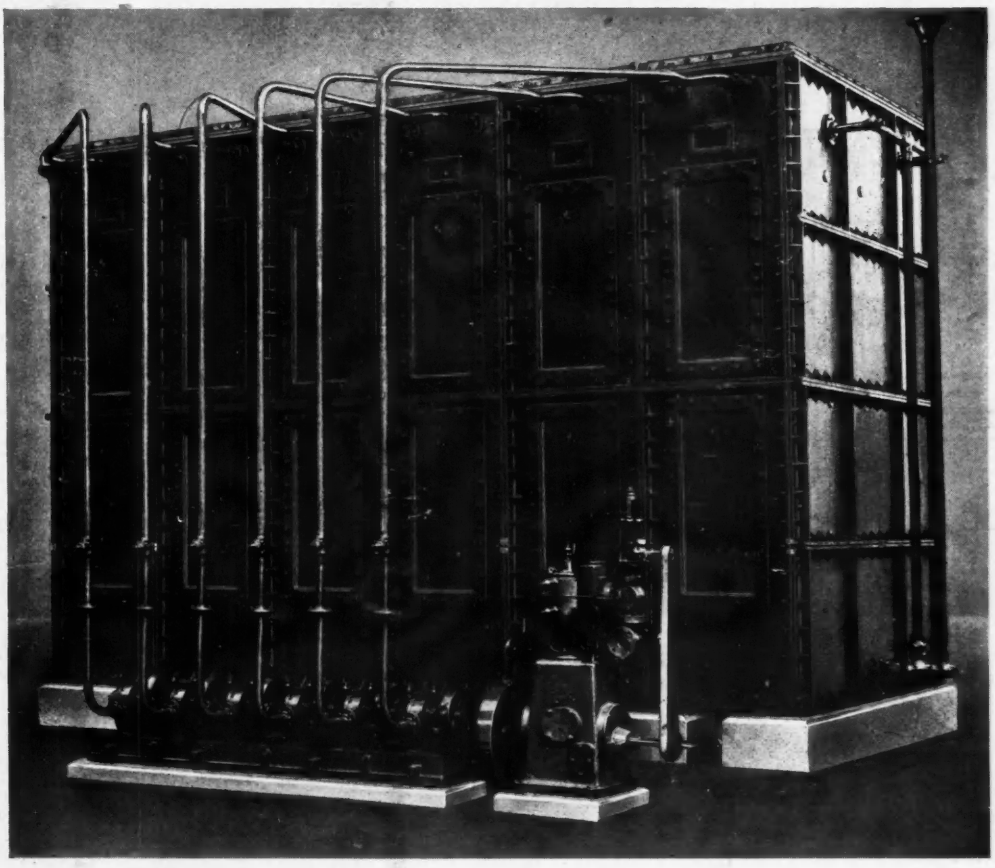

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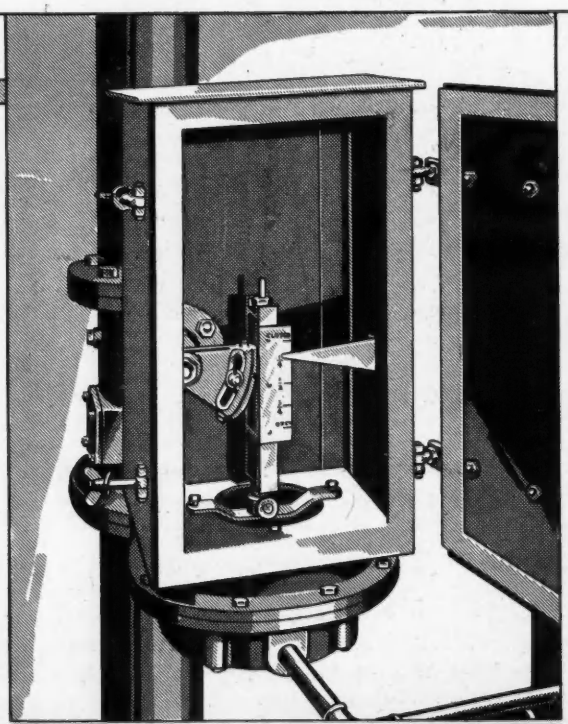

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GAS JOURNAL, AUG. 15, 1945
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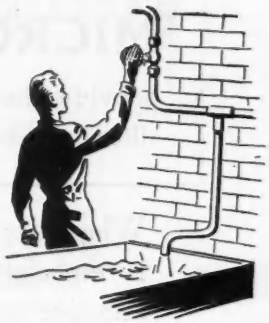

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Pumping and conveying water to where you want it take a lot of power (and much fuel and money). Water is even more precious if it has been heated or purified in your works.

How to make the best use possible of your water supply is told in these handy booklets :

FUEL ECONOMY BY WATER SAVING (*Bulletin No.* 31)

This is a survey of the economies (many of them substantial) that are possible in water supply for boiler feed, drinking and washing, process and cooling. It tells you, too, how to clean water mains and plant, and how to keep them clean.

WATER TREATMENT (*Bulletin No.* 39)

The correct treatment of water, whether for boiler feed, cooling or process is a matter for the specialist. This Bulletin surveys the whole field and describes briefly the methods available for overcoming your difficulties.

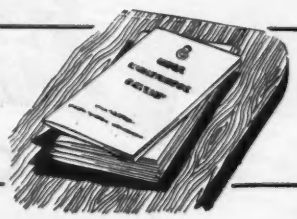
BLOW-DOWN (*Bulletin No.* 35)

Too often the blowing down of boilers is merely a matter of routine, bearing no relation to need. Excessive or insufficient blow-down are both serious fuel wasters. This Bulletin tells you why, when and how much to blow down.

THE UNORTHODOX USE OF ECONOMISERS (*Bulletin No.* 30)

This Bulletin shows how to obtain the maximum results from your feed-water economiser. Some of the suggestions may be new to you, e.g., the use of a condemned plant for process water heating or as an air heater.

A SOUND ANSWER to practically every problem of fuel economy is quickly found in these Fuel Efficiency Bulletins. Keep a list of their titles handy ; then you can turn up at once the particular Bulletin you need. The Bulletins are free from your Regional Office of the Ministry of Fuel and Power.



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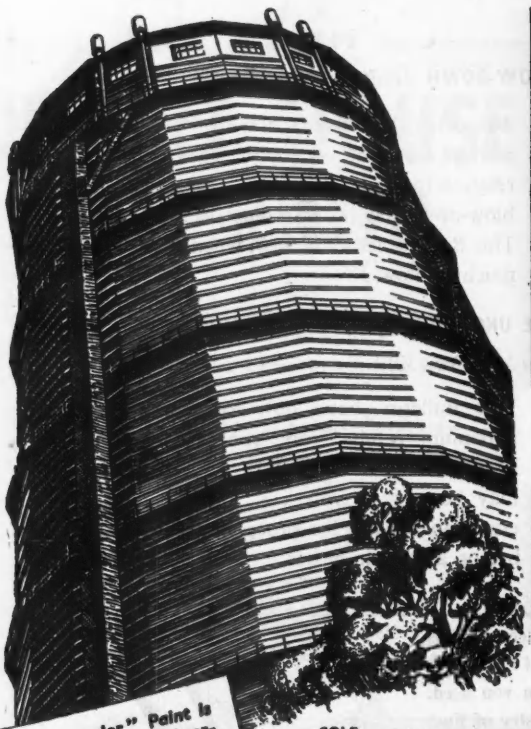

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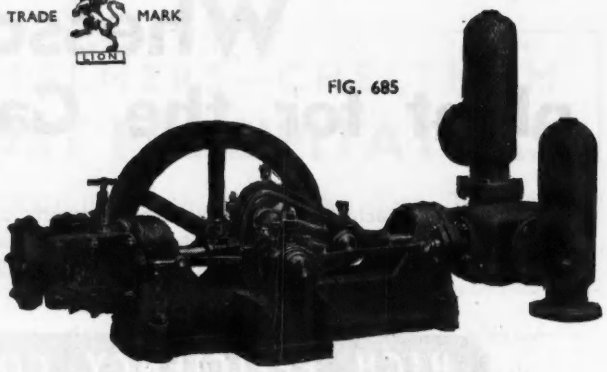

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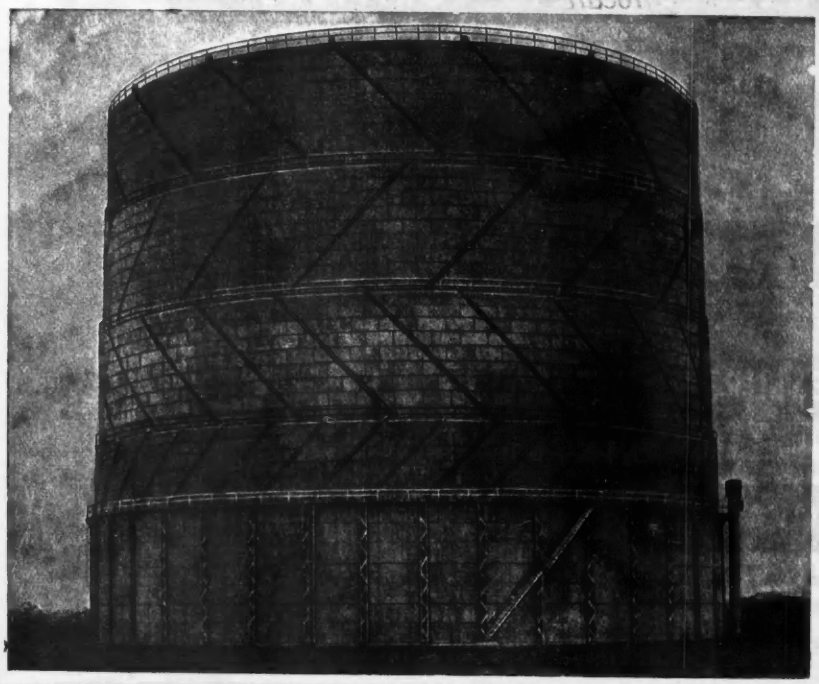

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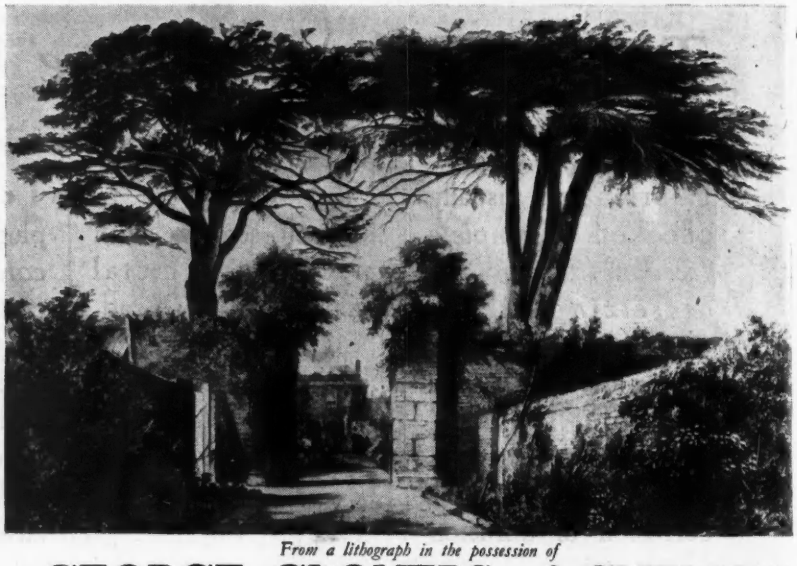
The two Cedars of Lebanon, planted in 1683, were the first ever brought to England. One of them survived until 1903.



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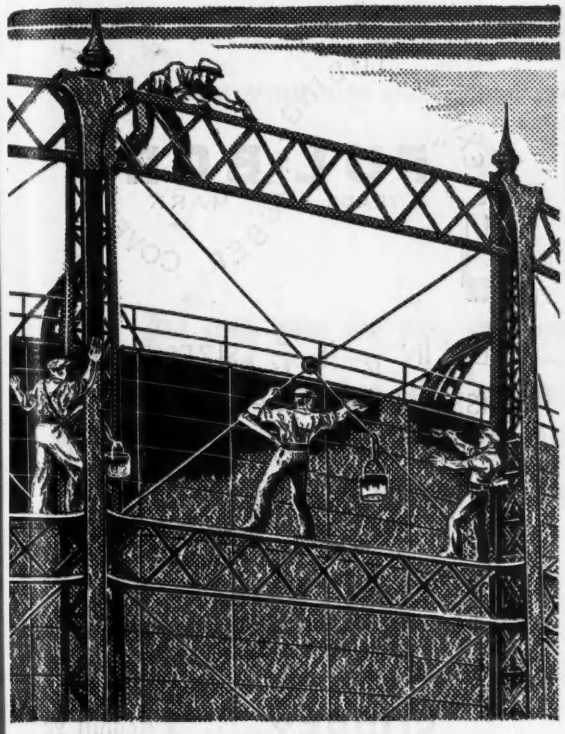

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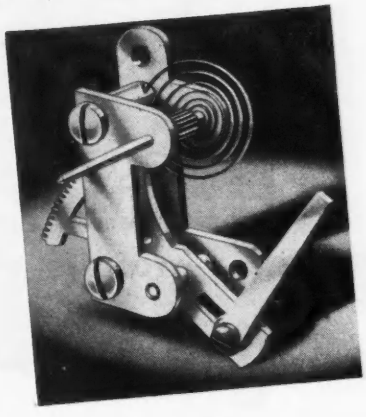

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DEMANDS ON THE GAS INDUSTRY

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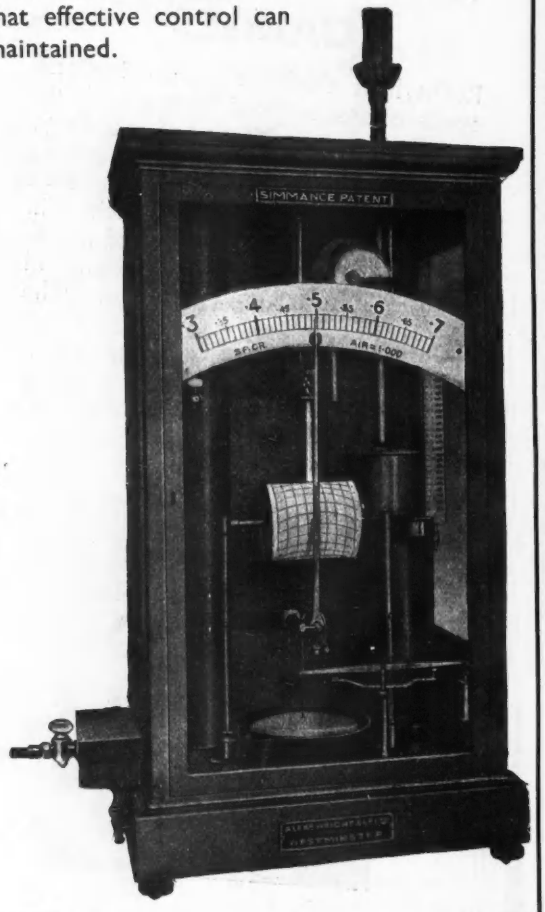

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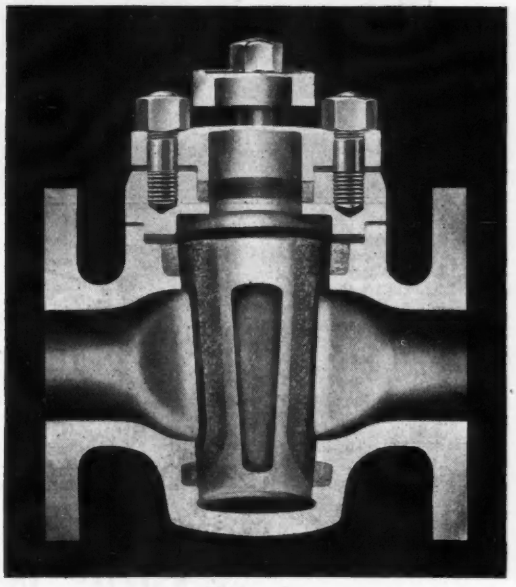
NOTABLE DEVELOPMENTS IN ENGINEERING HISTORY, 5

1875

ASBESTOS PACKED COCK



The typical construction of an Asbestos Packed Cock is shown in the sectional illustration above; the plug has been removed to show the system of grooves in which the indurated asbestos packing is caulked.

SINCE 1844 the energies of the Dewrance organization have been directed to satisfying the requirements of steam users, and recent announcements have indicated some of our early achievements.

This enterprising spirit has also prompted many other inventions and innovations now commonplace to steam users. The Asbestos Packed Cock is an example, the method employed to form a seal against fluid pressure was an entirely new departure from orthodox practice, when we introduced it in 1875.

We were also the first to supply valves with renewable seats; first to develop in this country the glass toughening process; first to supply Water Gauges with Automatic Valves in both arms, as well as the originators of many other improvements in the construction of boiler mountings.

We were again first in utilizing solid steel forgings for a wide range of steam fittings, a feature in production that avoids the defects inherent in steel castings. The valves and seats are made of "DEWRANCALLOY," a special heat resisting non-corrodible alloy which we developed for important internal components of steam fittings.

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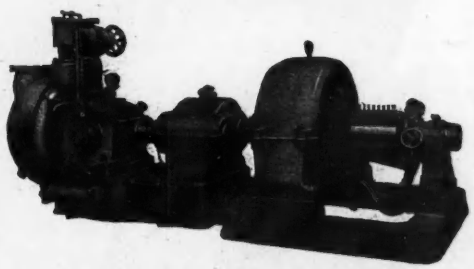

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GAS JOURNAL, AUG. 15, 1945

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EDITORIAL NOTES

APPROACHING THE IDEAL?

WE wonder. The major aims of the "JOURNAL" are to record as currently and as faithfully as possible the happenings of the Gas Industry and its constituent undertakings, including the activities of the manufacturers of plant and appliances connected with and serving the Industry, the deliberations of the Industry's technical and professional bodies, those of kindred and allied organizations, which embodies publication of the results of research and technical investigation, to give free expression to the views of its readers, and to endeavour to epitomize and interpret trends of thought and to offer suggestions. It is no part of the policy of the "JOURNAL" to enter into political controversy, and this does not necessarily indicate negation of viewpoint.

We have expressed the belief before now that political promises and political rhetoric have not raised the standard of technical efficiency or increased industrial output. It is our opinion that politics as such is on the down grade, and that as time goes on and the general mass of the public becomes, through education generally, more aware of the net effect to themselves of political blandishments, the less faith they will have in those who try to put it across from the electoral platform. This thought is wholly irrespective of and divorced from hues or banners, for the State is merely the sum total of individual effort, and psychology, though maybe a powerful instrument, hardly satisfies the belly.

In the recent election the Labour Party had a victory so overwhelming as to astonish even the most ardent of the Party's supporters. We suppose that this victory has in no way altered the essence of the problems which lie ahead and has in no way lessened their gravity. It has, of course, resulted in a new Minister of Fuel and Power, and Mr. Shinwell steps into the post of office occupied from the inception of the Ministry by Major Lloyd George. It is expected that the King's Speech planned for delivery to-day, August 15, will outline a general plan transferring the coal industry to public ownership—*i.e.*, giving effect to nationalization. It has been suggested that a Nationalization Bill will be laid before the House next autumn. It has also been suggested that the minds of Mr. Shinwell and his advisers are exercised concerning how to ensure that the men at the coalface will co-operate fully once the industry has been nationalized, and when they realize that nationalization will bring very little immediate change in their conditions. Major Lloyd George, when Minister of Fuel and Power, had a continuous story of disappointment to unfold regarding coal output. In common with the rest of the country we shall follow with liveliest interest, as the gravity of the coal output situation so obviously warrants, the statistics which will be unfolded by Mr. Shinwell in due course; for the service which our Industry can render to the gas consumer depends primarily on the quantity and quality of its raw material—coal.

The Ministry of Fuel and Power embraces electricity and gas. How far and with what speed Mr. Shinwell will press for the nationalization of those industries we do not know, but in this regard the nationalization limelight seems to be shining with greater intensity on electrical supply. And what will happen to the awaited report of the Heyworth Committee on the Gas Industry appointed by Major Lloyd George, before which Committee the Industry, we have been assured, has laid such a weight of evidence? Meanwhile the gas consumer turns his tap in the belief, so far not misplaced, that he will get immediate and unfailing service from an Industry willingly permeated with statutory rules and regulations, all of which safeguard the consumer's interests.

A RESEARCH CONSOLIDATION

BEHIND the bare announcement on a later page of appointments made by the Gas Light and Coke Company in pursuance of its aims to broaden the basis of the research programme and improve co-ordination of effort within the Company, there is much which concerns the whole Industry, for there will be universal agreement that the pioneering work of the Company in organizing for research into the problems of gas manufacture and those of the utilization of gas in both domestic and industrial spheres, together with the steps taken to ensure adequate and efficient training of personnel, has had repercussions to the lasting benefit of the entire Gas Industry. The Company—the world's largest gas undertaking—was, of course, and remains, in a strong position in regard to resources, both financial and intellectual, to plan boldly; and the results of this enlightened planning have helped enormously in the raising of the standard of gas service in all its aspects. We now have further steps in consolidation likely to improve this standard still further and with greater expedition and common working, and again, we are sure, to the benefit of gas service throughout the land.

Recognizing the essential interdependence of the problems confronting those concerned with the manufacture of gas and those dealing with its domestic and industrial applications the Company has wisely and timely brought the several research activities under one control, a co-operative arrangement the immense possibilities of which are apparent. As will be seen from our announcement, Dr. Hollings has been appointed Controller of Research and now becomes responsible for the activities of Watson House as well as those of the Fulham Research Laboratory. Others appointed to senior positions bear names known and respected throughout the Gas Industry by virtue of outstanding work undertaken with conspicuous success in the common interest. Mr. Dieterichs becomes Manager of Watson House, Mr. Holliday Manager of the Gas Light Centre, Dr. Griffith Senior Research Chemist, and Dr. Pexton Senior Chemical Engineer, the last named appointment—a liaison between everyday works practice and the research laboratory—being significant of modern thought in the handling of development problems and evidence of the marked change in outlook during the past quarter of a century. We feel that, though these various steps have been taken primarily and naturally as a measure to strengthen the Company's internal research organization and to weld together to more effective purpose the several group activities into a composite whole under unified direction and control, they will have influence regionally and farther afield.

It needs no stressing at this time of day that effective development of the type envisaged demands the provision of adequate laboratory, drawing office, and workshop facilities, and calls for exercise of the team spirit as well as appreciation and encouragement of the individual idea. Certainly experience has proved the efficacy of team working. We single out the virtual solving of the gum problem by the Fulham research staff as a typical example—and it is an example by no means isolated. And published technical literature reveals the flow of ideas from this source—ideas covering not only gas but solid smokeless fuel also. It may be of interest to mention that at the outbreak of war in 1939 the staff at the Fulham Laboratory numbered 75, of whom no fewer than 28 held science degrees—a staff whose work individually and collectively on such questions as benzole recovery by active carbon, condensation, cracking of gas oils, catalysis, fuel requirements of carbonizing plant, and so on, is well enough known. At that time at Watson House, staff and

employees numbered 530, engaged on domestic and industrial appliance development, materials testing, and, of course, the training of personnel.

We learn that the immediate intention of the organization on its new co-ordinated basis is to overhaul the programmes of work in the light of post-war conditions; and, indeed, it may well emerge that special problems could more advantageously be tackled elsewhere than in the Company's own laboratories—maybe by some such body as the National Physical Laboratory or by a university. All this fits into a general pattern which is making itself discernible in other research organizations. Taking the field of gas utilization there are several approaches which require elucidation. For example, what is the effectiveness of design of a, say, gas heating appliance in the absence of a more thorough understanding than exists at present of what factors in combination determine that loosely described "condition of comfort"? So one could go on, but the parading of examples is not the purport of this note. Neither is the note a panegyric of the Gas Light and Coke Company; on the other hand, it is written in the belief that the present step in the consolidation of the Company's research is the reverse of mistaken, and holds promise of benefiting the community and our Industry.

RELEASE OF ATOMIC ENERGY

THE past week has been one of the most momentous in history. Declaration of the defeat of Japan and the end of an unparalleled global struggle is imminent, and the declaration may well have been made before this issue of the "JOURNAL" comes off the press. Then there has been the dreadful demonstration of the powers of destruction of the atomic bomb—an astounding achievement in producing an enormous display of power on the basis of experience gained by the study of minute effects. Into the moral principles involved in the use of this machine of destruction we have no intention of entering; but the achievement, besides a most intensive research effort, required an immense engineering enterprise, strikingly illuminating, as Professor Bohr has remarked, the potentialities of modern industrial development.

The scientific history of the atomic bomb and the intensive work on it by scientists of Allied countries since 1939 have been outlined in a long British Government document issued on Aug. 12 and a report was issued simultaneously by the U.S. War Department—these apart, of course, from the very many articles in the National Press. The achievement is a most astonishing linking up of brilliant individual scientific work from 1896 onwards. In that year came the discovery of radio-activity by Becquerel and the Curies, and there followed the discoveries made by Rutherford, Niels Bohr, Chadwick, and Lawrence, Joliot, van Halban, Kowarski, Alder, Gant, Fermi, Urey and Brickwedde, Pierles, Frisch. Doubtless we have omitted many names; certainly many countries are represented in this short reference. Then came the prodigious task of rendering possible the large-scale release of atomic energy. A world community of scientists was, so to speak, welded into one team; and here again there is no need for us to go into the story of the expenditure of £500,000,000 and the employment of thousands upon thousands of workers which made this overwhelming achievement possible.

Naturally speculation is busy with the possible peacetime uses of the enormous energy available in nuclear reactions—energy easy to release, but by no means easy to control. Doubtless the possibilities are there. The U.S. War Department report to which we have referred suggests that as far as development along non-destructive lines is concerned there is the probability that nuclear power for special purposes could be developed within ten years, and that plentiful supplies of radio-active materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases. Doubtless we are entering on a new era, with a source of energy that may dwarf all others in time to come. The Scientific Correspondent to *The Times* (issue of Aug. 8) went so far as to say that to-day "he who is plaguing himself about the exhaustion of the coal and oil fields of the world in the next 100 years can, indeed, have few genuine cares." As a source of refined energy the Gas Industry is naturally especially and vitally interested in this awe-inspiring achievement of the release of atomic energy. A colossal expenditure or accumulation of energy, it would seem, must be required in the first place to make possible the nuclear fission of the particular isotope of uranium. We hope subsequently to discuss rather more closely the implications of this fundamental consideration.

Personal

Gas Light Research Appointments

The Directors of the Gas Light & Coke Company have considered the future development of the research work which the Company has carried out in a wide field for many years, and they have decided to broaden the basis of the programme and to arrange for improved co-ordination of effort within the Company.

Dr. H. HOLLINGS, hitherto the Chief Gas Chemist of the Company, has been appointed Controller of Research, and he now becomes responsible for the activities of Watson House as well as those of the Fulham Research Laboratory.

As part of the new arrangements the Directors have made the following further appointments: Mr. W. DIETERICHS to be Manager, Watson House; Mr. G. C. HOLLIDAY to be Manager, Gas Light Centre; Dr. R. H. GRIFFITH to be Senior Research Chemist; Dr. S. PEXTON to be Senior Chemical Engineer.

* * *

Consequent on the resignation of Mr. A. G. I. ANDERSON from the position of General Manager and Secretary of the Shotley Bridge and Consett District Gas Company in order to take up the appointment of Engineer and General Manager of the Bognor and District Gas and Electricity Company, the Board of the Shotley Bridge Company has made the following appointments: Mr. J. R. MATTHEW, Engineer and Manager, Stanley and District Gas Company, Ltd., to be Engineer and Manager with effect from Sept. 1; and Mr. W. T. HOSKINS, Accountant of the Shotley Bridge Company, to be Secretary with effect from Aug. 1.

* * *

Mr. L. B. CHAPMAN, Gas Engineer and Manager to the Skipton Urban District Council since June, 1936, has accepted the position of Engineer and Manager at Skegness, and will take up duty there on Oct. 1. A native of Newcastle-on-Tyne, he took his B.Sc. degree as an external student of London University and is an Associate Member of the Institution of Mechanical Engineers. He began his Gas Industry career with the Newcastle Gas Company, and was later at Tipton and Nelson before going to Skipton.

* * *

Mr. ALFRED HARRISON, Deputy Engineer and Manager to the Accrington and District Gas and Water Board, will succeed his father, Mr. A. G. Harrison, as Engineer and Manager when the latter retires on Sept. 30. After a period with Messrs. Ashton Frost & Co., Engineers, Blackburn, Mr. Alfred Harrison joined Accrington District Gas and Water Board as a pupil in 1925. He became deputy to his father in 1944.

* * *

Mr. J. MARSHALL, Chief Works Superintendent, Lincoln Gas Department, has been promoted to the position of Assistant Gas Engineer and Manager. Mr. G. TWIST, Industrial Sales Manager, retires on superannuation next month at the age of 60 years, after 42 years' service. Mr. Twist was asked to continue in his appointment for the time being, and has consented to do so.

* * *

Mr. W. DERRICK WILSON, B.E.M., has been appointed Joint Managing Director of George Wilson Gas Meters Ltd. Mr. Wilson entered the Company in 1929, and was appointed Assistant Managing Director at the formation of the public company in 1937.

* * *

Mr. REX CHESTER, Chairman and Managing Director of Donald Macpherson & Co., Ltd., has been appointed a Magistrate for the County of Hampshire.

Obituary

The death has occurred at Stevenston, Ayrshire, of Mr. WILLIAM MANN, who was Manager of the Stevenston Gas Company for the past 30 years. He went to Stevenston from Broughty Ferry.

Letters to the Editor

Carbonization Reactions

DEAR SIR,—I am at a loss to understand the attitude of mind which induced Mr. John Roberts to write the letter which appeared in your issue of July 18. To try to discredit the present work of another by suggesting that the writer had made an error in interpretation of results of experiment 20 years ago is not quite what I should expect from a man holding Mr. John Roberts' position in the carbonizing industry, but to attempt to do this when the mistake is in the mind of Mr. John Roberts is to me incomprehensible.

I have carefully gone through my file containing the whole of the published subject-matter dealing with the controversy of 1925 on the flow of gases during carbonization, in which Foxwell, Mott, Everard Davies, Schmidt, Sensicle, Thau and myself were the central figures, and I find no statement of mine that all the volatile products during carbonization take an inward and upward path.

In proof of this statement I would quote Mr. Everard Davies, who, on July 4, 1925, wrote a letter to the *Gas World*, summing up in an excellent way the previously published arguments. He stated: "The issues at variance between Dr. Foxwell and Mr. Biddulph Smith do not appear to have been clearly defined. It would therefore, in the writer's opinion, be advisable to discriminate between the essentials and the accidentals of the controversy. Firstly both workers admit an inward flow of the gases over an initial part of the coking period; both further admit of a reversal taking place at a later period. Beyond this common ground there are many details which apparently form the bones of contention, and which as elucidated by the two parties characterize their respective theories on the flow of gases."

The main conflict between Dr. Foxwell and myself was as to the relative amounts of evolved products passing "inwards" or "outwards," and in mutual criticism of each other's method of procedure in arriving at this information.

Never at any time was it suggested by any of the gentlemen mentioned above, whether they supported Dr. Foxwell or myself, that all the volatile products of carbonization took any single direction. It is quite true some people, unable to follow the mass of arguments put forward, believed there were two schools of thought—one suggesting all the products passed inwards, while the other suggested they all passed outwards, but Mr. John Roberts was then not "among the minnows" where matters dealing with carbonization were concerned, and this makes understanding of his remarks the more difficult.

It would be strange if, as he suggests, Dr. Foxwell and myself were so fundamentally opposed, we should both eventually arrive at similar conclusions, since Dr. Foxwell, in his Paper of 1935 entitled "The Production in the Coke Oven of Oils and Tars from Coal," wrote: "A very high yield of primary oils might be obtained if we did but know the right way to go about it."

Mr. John Roberts next trails a "red herring," suggesting hydrocarbon vapours evolved on the hot side of the plastic layer travel horizontally to the wall, and then up the face of the latter to the free space. I believe him to be wrong, but his suggestion does not affect my theory as outlined in the Paper, unless by any chance he claims this to be a cooler passage in which hydrocarbon decomposition does not occur.

Later he says I claim priority for the suggestion of a central offtake, and here again he is unfortunately wrong. In the Paper I said: "In 1926 the Author published a Paper on the extraction and examination of oils from the centre of a carbonizing charge, and shortly afterwards Carl Still applied its principles to practice in his internal suction oven," the results and limitations of which I then proceeded to explain. I have made no claim to be the first either to extract or to examine oils produced during carbonization.

If Mr. John Roberts had read my Paper carefully he would have seen why Hird, Warner, Still, and others failed to obtain higher yields of oils. This explanation is given in the passage, "These are considerable claims for the protection of only the small amount of 'inner passage' hydrocarbon vapours, the *much larger amount evolved on the hot side of the plastic layer being still practically decomposed.*"

Finally I would like to ask Mr. John Roberts if it was not Dr. A. Jenkner who collected the data on the German patents he mentions as being described by himself in *International Coal Carbonization* since, though he fails to mention it, Dr. Jenkner was joint Author of that valuable work of reference.

Broadway, Partington.
Aug. 7, 1945.

Yours faithfully,
T. B. SMITH.

Baron von Welsbach's Laboratory

DEAR SIR,—Recently, whilst reconnoitring in S. Austria for a camp for my company, I came across an attractive chateau set high up in the wooded hills of Carinthia, well off the beaten track. The owner proved to be Dr. Baron Hermann von Welsbach, son of the famous scientist whose name is so well known to the Gas Industry in connexion with gas mantles. The laboratory, in one wing of the castle, is preserved almost in its original state. The present Baron Welsbach recently presented to me a photograph of his father as a souvenir.

C.M.F.
June 8, 1945.

Yours faithfully,
D. DOUGLAS GILL.

Gas Industry Terms

DEAR SIR,—As Chairman of the Editing Committee which prepared the British Standard Glossary of Gas Industry Terms, I should like an opportunity of commenting on the letter from "Carboniser" which appeared in your issue of May 23. In the first place, your correspondent expresses in kindly fashion his personal views on the suitability or otherwise of some of the terms for retention by the Gas Industry.

It should be pointed out that the Committee which has prepared the Glossary was charged with the duty of explaining the technical terms as they are actually used in the Industry. It was not primarily its business to set up as arbiter as to whether any particular term should or should not be used. On the other hand, in conformity with the practice adopted with other Glossaries prepared by the British Standards Institution, the liberty was taken of indicating which of synonymous terms, in the opinion of the Committee, was the term to be preferred. Only in rare instances was outright deprecation expressed. It is natural that in an old-established industry various opinions are held on such matters, and it will be of great value in connexion with any revised edition, when called for, if others will follow "Carboniser's" lead in expressing their views, preferably to the British Standards Institution direct.

"Carboniser" asks whether the term "volatile therms" is ever likely to be useful. My own opinion is that, in the sense of definition 1102(*a*), it is. With the recognition that from the viewpoint of thermal efficiency of the carbonisation process, the heat in the tar and benzole is as important as the heat in the permanent gases, it seems necessary to have a term which refers to the whole of the *combustible* material evolved during carbonisation.

It is, perhaps, somewhat unfortunate that the term "volatile therms" has been adopted in connexion with the test for volatile matter left in the coke (B.S. 735 : 1937). This prompts the suggestion that it is very desirable that anyone who wishes to refer to a new conception should as far as possible avoid using a term which already possesses a distinctive meaning. The availability of the present Glossary may be useful in this respect. In passing, I do not think that "Carboniser's" comment on the term "volatile therms" is quite appropriate, since "therms per ton" without any qualification would be taken throughout the Industry to refer to the yield of permanent gases, and would not be confused with "volatile therms" in the sense of the definition.

The issue of "-ize" versus "-ise" seems to be a matter of controversy even between authorities of the highest standing. The Committee in adopting the variant "-ise" may be on the side of the angels, for Shakespeare somewhere exclaims "Thou zed, though unnecessary letter"! Perhaps, among the schemes of nationalisation which are in the air, the issue may be rationalised and standardised. Whatever courage the Committee may have displayed in taking sides in this issue, it did not sustain them in the "-or" or "-er" controversy. All that can be said is that when the Gas Industry decides to become logical in this matter, the Committee will follow suit.

"Carboniser" suggests that the meanings attributed by the Committee to the terms "crude gas" and "raw gas" should be reversed. It was known that practice varies somewhat in different parts of the country. The Committee would welcome enlightenment as to when a gas is "crude" and when it is "raw."

In conclusion, the publication of the Glossary in wartime precluded as complete a consideration of the final draft by the various authorities sponsoring the Glossary as is usual under peacetime conditions. Anyone interested, however, can make a contribution to any future edition by sending to the British Standards Institution their suggestion for additional new terms, additional synonymous terms, and additional meanings or corrections to the terms in the present Glossary. I can assure any such that it is a salutary experience to attempt to explain concisely, accurately, and comprehensively what one means when one uses an all-too-familiar technical Gas Industry term.

Uplands,
Epsom Road,
Guildford.
Aug. 9, 1945.

Yours faithfully,
FRANK S. TOWNEND.

The Balloon Barrage

DEAR SIR,—In the discussion on "The Gas Industry and the Balloon Barrage" reported in your issue of Aug. 8, reference is made to the ring filling of the caustic soda washing towers at Kilmarnock. To avoid any confusion we wish to point out that the 1½ in. by 1½ in. rings "fashioned from hoop iron" were of our standard Lessing type. The porcelain rings which caused trouble in the early stages were not supplied by us.

14, *Gloucester Road,*
London, S.W. 7.
Aug. 10, 1945.

Yours faithfully,
THE HYDRONYL SYNDICATE, LTD.

The Gas Industry and Fertilizers during the War and After

By P. PARRISH, F.R.I.C., F.C.S., M.I.Chem.E., F.I.I.A.

THE wartime stories of many activities are now being told, and an endeavour is being made to indicate possible developments in the future. No one will deny that War Agricultural Executive Committees have done a solid job of work, and it is generally conceded that the Technical Development Sub-Committees of the foregoing bodies have been peculiarly helpful. They have organized demonstrations, farm walks, discussions, brains-trusts, and conferences of all kinds, which have culminated in a flood of policies for post-war agriculture. Whatever pattern British agriculture may ultimately assume, the urge for greater technical efficiency must undoubtedly be maintained.

The Gas Industry cannot lightly disregard future trends. It produces far more sulphur than is required for the fixation of the ammonia resulting in the processing of coal, and this sulphur, as spent oxide, must be sold for some purpose or other. Everything points to the fact that it will need to be used for the manufacture of sulphuric acid, which in turn must be employed to render water-soluble the phosphate rock which is the present basis of the calcium superphosphate industry.

But the basis of this industry is not likely to go unchallenged. Attempts have been made, more or less successfully, to remove fluorine from phosphate rock by heat treatment. Any process which will "break down" the molecule—calcium fluorapatite—$Ca_{10}(PO_4)_6F_2$, and leave alphatricalcium phosphate, or monocalcium phosphate, or calcium superphosphate, will render phosphorus available to growing plants. Indeed, if the removal of fluorine is sufficiently complete (to less than 0.1% F.), the material may be used as an animal food. The writer, in the second edition of *Calcium Superphosphate and Compound Fertilizers: Their Chemistry and Manufacture* (now in the printers' hands), has observed:

> "The view has been held in this country, somewhat tenaciously, that there is no evidence that fertilizer manufacturers have reason to question the wisdom of accepting water-solubility as the only criterion for soluble phosphoric acid under the Fertilizers and Feeding Stuffs Act regulations. This view may call for further consideration at an early date, as it may well be that developments during the world war may be such as to indicate that too implicit an adherence to water-solubility may be a retrogressive step."

Dr. E. M. Crowther, Head of the Chemistry Department, Rothamsted Experimental Station, speaks in no uncertain terms on this subject in a recent review, when he observes:

> "In Great Britain we suffer an unnecessary restriction by requiring our superphosphate and compound fertilizers to be valued in terms of their water-soluble phosphoric acid. In the early days of the industry water-solubility served to distinguish poorly-made samples, but the industry is now so efficient that this test has outlived its usefulness. It has even become an obstacle to progress, because many of the new products have little water-soluble phosphate, even though they are just as readily available to crops. In the United States, France, and a few other countries, an alternative test is based on extracting with ammonium citrate solution. Some other test than water-solubility must soon be introduced into our fertilizers and Feeding Stuffs Act regulations, in order that full advantage may be taken of current and future research."

Lower Sulphuric Acid Demand

Here again the use of lesser quantities of sulphuric acid is clearly foreshadowed, because it is conceivable that calcium superphosphate may be replaced by a citrate-soluble phosphate—that is, dicalcium phosphate ($CaH_2P_2O_8$). This product may be made by treating calcium superphosphate manufactured in the ordinary way, by basic slag, or perhaps calcium superphosphate may be mixed with crude ammonium bicarbonate and an ordered reversion may be permitted to proceed to the dicalcium stage. In any case, the use of less sulphuric acid can be foreseen.

But this is not all. It has been known for some time that soda ash may replace sulphuric acid in the manufacture of phosphatic fertilizers. Indeed, one new product has given very good results in the field, and will shortly be put on the market. It is silico-phosphate. This product is prepared by sintering mineral phosphate with soda ash and silica in a cement type of furnace, and driving off the fluorine by steam.

The foregoing product became of interest when shipping difficulties may have rendered impossible delivery of pyrites and brimstone to this country in 1940. Its significance to the Gas Industry resides in the possible loss of another market for its spent oxide. Little wonder that processes for recovering the H_2S of crude coal gas in the form of relatively pure sulphur, and thus commanding wider opportunities for sale, are exciting increasing interest. But Dr. Crowther's review is of significance to the Gas Industry, apart from the aspects already referred to.

Sulphate of Ammonia Problems

Sulphate of ammonia was produced in sufficient quantities throughout the war to make restriction unnecessary, except for one short period at the end of 1943. Storage was the main difficulty. Factories must work at full pressure throughout the year, but farm demand reaches an acute peak in spring. To overcome the inability of factories having to store the greater part of the year's production, and the impossibility of transport services delivering a vast quantity shortly before the farmers needed it, a special Government Distribution Allowance was introduced in 1941. Each July a limited amount of sulphate of ammonia was offered at reduced prices for delivery at the manufacturers' convenience, the rebate being 28s. per ton in 1941 and 1942, and 15s. per ton in 1943 and 1944.

One problem has yet to be solved—namely, the caking of sulphate of ammonia during storage at the farm. This problem, in the writer's view, can only be resolved by resorting to the use of the original Calcutta twill bags, instead of hessian bags, and by the farmers making provision for storing the sulphate of ammonia which they receive under conditions which will not admit of the deposition of dew. In other words, the simple device of circulating hot air, so as to maintain a temperature of 18°C., would appear to be all that is necessary, always provided that the storage buildings are well built and suitably drained.

The question is often asked: What was the fertilizer consumption in European countries in 1936, expressed in terms of plant food units? These figures have now been supplied in the review in question. They are given below, because of their importance:

TABLE I.—FERTILIZER CONSUMPTION IN EUROPEAN COUNTRIES, 1936 EXPRESSED IN PLANT FOOD UNITS.

	Total amounts in thousand tons.			Cwt. per acre arable land.				Plant food ratios.		
	N.	P_2O_5.	K_2O.	N.	P_2O_5.	K_2O.	Sum.	N.	P_2O_5.	K_2O.
Holland ...	62	95	92	0.54	0.82	0.80	2.16	1	1.5	1.5
Belgium ...	56	55	46	0.42	0.41	0.35	1.17	1	1.0	0.8
Germany ...	483	623	961	0.20	0.26	0.40	0.86	1	1.3	2.0
Denmark ...	35	65	36	0.11	0.20	0.11	0.41	1	1.9	1.0
Great Britain	66	188	74	0.08	0.22	0.08	0.38	1	2.8	1.1
France ...	144	387	217	0.05	0.15	0.08	0.28	1	2.7	1.5

It will be seen that the average rates of manuring varied sensibly from country to country, dependent on the general intensity of farming and on the proportion of market gardening. The difference between countries would be less marked if it were possible to assemble data for the total consumption of plant foods in all forms. Fertilizer practice in the six European countries listed in the foregoing table differed notably in the proportions in which the three plant foods were used. Great Britain used most phosphoric acid in proportion to nitrogen, and Belgium least. It is clear that as fertilizer practice develops with more intensive farming, the ratio of nitrogen to other plant foods will increase.

Wartime agricultural policy required maximum output of human food. Cereals, potatoes, and vegetables were given the highest priority among crops. Cereals increased very rapidly for the first two years of the war, and then more slowly. The main need of cereals is nitrogen. One cannot give accurate estimates of the ammonia used before the war, but in one survey of the manuring of potatoes and immediately-preceding crops, it was found that two-thirds of the cereal crops throughout the country received no nitrogen fertilizer.

Nitrogen as Fertilizer

To demonstrate the increase to be obtained from a more general use of nitrogen, Crowther and Yates calculated that in Great Britain, in the years immediately preceding the war, about £1 million was spent on nitrogen fertilizers for cereals, resulting in extra crops worth £4 million. If an average rate of 1 cwt. sulphate of ammonia per acre had been used on the pre-war cereal acreage, the extra crop would have been worth £11 million, for an outlay of £3 million. For twice this rate the extra crop would have been worth £17 million.

The Survey of Fertilizer Practice shows that in 1942 about 60% of the greatly-increased cereal acreage received the equivalent of 1¼ cwt. sulphate of ammonia per acre. Dr. Crowther is emphatic in asserting that "this great improvement on pre-war practice has been a major contribution to the country's food supply and the farmers' profit."

The bulk of the nitrogen should be applied in spring, preferably in divided dressings, one early and one late. On heavy soils some of the nitrate built up during the summer fallow may be carried over to benefit the next cereal crop, unless the following winter and summer are too wet. On all soils nitrogen fertilizers have the indirect residual effect that by increasing the amounts of fodder crops and straw, they also augment the quantity and value of the farmyard manure produced.

Nitrogen fertilizers are said sometimes to exhaust the soil, or to "draw the land." Certainly the bigger crops take more out of the land; but farmers do not object to good weather, good seeds, or good cultivation, because they, too, give bigger and more exhausting crops.

Experienced potato growers in Cambridgeshire and South Lincolnshire use heavy dressings of fertilizers, commonly 15 cwt. or more per acre. Before the war compound fertilizers for potatoes generally had much more phosphoric acid than either nitrogen or potash, and sometimes even more than the sum of the two. The results of experiments show that potatoes should receive roughly equal amounts of these three plant foods, at least where dung is used.

In 1944–45 the Fertilizer Permit allows 10 cwt. of a mixture supplying 0.7 cwt. N, 0.7 cwt. P_2O_5 and 1.2 cwt. K_2O per acre.

Sugar beet requires roughly equal amounts of the three plant foods, but less phosphate and potash, or even a nitrogen fertilizer alone, on dunged fields. For swedes, dressings of nitrogen should be kept down to the equivalent of 1 or 2 cwt. sulphate of ammonia per acre. Illustrative of the effects of climatic conditions in most districts, 1 cwt. sulphate of ammonia per acre may be taken as the upper limit for cereals and swedes. In very wet areas—*e.g.*, Northern Ireland—the nitrogen for potatoes should be kept down to 1–2 cwt. sulphate of ammonia per acre, as heavy top growth may allow blight to spread more rapidly, and also delay ripening. The western counties of England use about half as much nitrogen for cereals, potatoes, and swedes as the eastern ones, but nearly the same rates for sugar beet and mangolds, for which there is less objection to heavy growth of tops.

Other interesting observations may now be briefly indicated.

Sulphate of ammonia necessarily increases the loss of lime from the soil, but the effect is fairly small (about one-third of the weight of sulphate of ammonia), and is easily put right by regular liming. Sulphate of ammonia is very useful for shallow-rooted crops in wet districts, and especially for potatoes and oats.

Ammonium nitrate has the inherent disadvantage of taking up moisture from the air. If this can be overcome by water-proofing the granules, or in some other way, the existing plants can produce a useful fertilizer. One process is to granulate ammonium nitrate with calcium carbonate. This results in the well-known proprietary product—Nitro Chalk.

In Great Britain about half the plant food was produced as "straights" and half as compounds, of which there was a large variety. The war has led to simplification, and to the introduction of national standard compounds in 1942, to meet the needs of private gardeners and allotment-holders. National Growmore Fertilizer, with 7% N, 7% P_2O_5, and 7% K_2O, at a price of 25s. per cwt., is undoubtedly popular. To facilitate the National Fertilizer Rationing Scheme in 1943–44, three National compound fertilizers were prepared, and the recommended dressings to cover the rations are:

TABLE II.

	N.	P_2O_5.	K_2O.	March-June price per ton.	Standard dressing per acre.
	%	%	%		
No. 1 ...	7	7	12	£11 5 0	10 cwt. for potatoes.
No. 2 ...	9	7·5	4·5	£10 10 0	7 cwt. for sugar beet and mangolds.
No. 3 ...	6	12	—	£9 2 6	4 cwt. for other roots.

Manuring for Quality

On the subject of manuring for quality it should be noted that there is no universal definition of quality, and no simple formula for obtaining it by manuring. Compost enthusiasts argue by analogy from the known importance of vitamins in animal nutrition, and of hormones in plant and animal physiology, that similar materials ought to be important in feeding plants. Biochemical research progresses rapidly, and it is conceivable that some day there must be added certain complex organic molecules to the lists of essential plant nutrients. Examples may possibly be found in which fertilizers and manures affect the vitamin contents of crops. While these possibilities can be reflected upon and a search made for them, it is wrong to assume the results in order to advertise special practices. For the fodder crops, hay and straw, the principal factors are the proportions of protein, readily-digestible carbohydrates, fibre, vitamins, and minerals, especially calcium and phosphorus. For sugar beet the quality depends primarily on sugar percentage, by which prices are fixed in this country. But other factors may also influence the extraction and crystallization of sugar in a factory. For barley the nitrogen percentage on dry weight is an important factor, and field experiments have shown that neither the price given by skilled valuers nor the nitrogen percentage is appreciably altered by moderate dressings with nitrogen fertilizers, which greatly increase yields.

Dr. Crowther has a word to say about the claims of the Howardists. One can only epitomize his observations. Briefly, there is no conflict between using bulk organic manures and using fertilizers, as the two classes of material serve quite different purposes. Both add plant foods, but bulk organic manures also furnish appreciable amounts of organic materials, which may have immediate physical effects on the soil and important secondary ones, through increasing the amounts of more fully-rotted material, sometimes called humus. This colloidal group of materials plays an important part in maintaining good soil structure, in holding some plant foods in immediately available forms, and slowly liberating others.

At the moment there is little to gain by ascribing the benefits from organic manures on agricultural land to "feeding the bacteria."

Most of the foregoing aspects are culled from, or are prompted by, a study of *Fertilizers during the War and After*, by E. M. Crowther, D.Sc., F.R.I.C., Head of the Chemistry Department, Rothamsted Experimental Station, Harpenden, Herts—Pamphlet No. 13, May, 1945, published by the Bath and West and Southern Counties Society.

The review in question deserves a better name than "Pamphlet No 13." It covers a wider range of topics than can possibly be commented on here, and it should have been printed in a more permanent form. Readers of the "GAS JOURNAL" should study it with care, noting the progress that it records, and memorizing the signposts of the future. Dr. Crowther is to be congratulated on a classic contribution to our knowledge of fertilizers, their methods of application, and their signal value as instruments in the production of human and other food.

Gas Undertakings' Results

Bradford Gas Department.—The report for the year ended March 31 shows a gross trading profit of £117,568 and a net profit of £49,124, these figures being £38,732 and £40,642 higher than those for the previous year. Total revenue at £704,562 was higher by £99,087, but working expenses at £586,994 were up by £60,355, coal costing £47,390 more and wages and salaries £5,698 more than last year. A further substantial increase in gas sales is reported. In view of all the increased costs the Department has had to meet and the fact that the price of gas at Bradford compares favourably with other undertakings, the financial results are considered extremely satisfactory.

Stourbridge Gas Department.—In his fourth annual report Mr. S. J. D. Williams, Engineer and Manager, states that the profit on revenue account for the year to March 31 was £29,153. From this total £27,120 is deducted for sinking fund, interest and taxation charges, and capital expenditure not included in borrowing powers, and of the balance, three-quarters goes to the General District Fund and the rest to contingencies. The working statement shows a total make of 648,410,000 cu.ft. of gas (16,667 cu.ft. per ton of coal carbonized), 25,885 tons of coke, and 2,977 tons of tar.

Warrington Gas Department.—Mr. J. E. Wakeford, Engineer and Manager, in his report for the year ended March 31, states that the operating profit was £48,549, against £52,834 for the previous year. Gas sold amounted to 1,182,000,100 cu.ft., against 1,153,049,100 cu.ft. The industrial load showed a slight decrease, due to the response to the appeal made by the Ministry of Fuel and Power for economy in fuel consumption. Compared with the previous year, the income from the sale of gas was £5,533 more and from the sale of residuals £2,501 less. Working expenses were £6,203 more than in 1943–44. Manufacturing charges showed a decrease of £105, and expenditure on distribution was £1,660 less than in the previous year. Expenditure on public lighting increased by £2,283, and £4,156 more was spent in connexion with cooking ranges and maintenance. Management and general expenses increased by £1,502. A net profit of £22,289 has been carried to appropriation account, which shows a balance of £62,138 after defraying capital expenditure of £7,365. Capital expenditure during the year was £60,653, of which £53,287 was met out of borrowed money. Total capital expenditure to date, after deducting £2,772 for land sold to the transport department, is £846,431.

Problems of the Coal Industry

In the course of his Presidential Address to the National Association of Colliery Managers, Mr. J. Robertson said: The problem facing the coal-mining industry to-day is one from which escape is impossible; it has to be faced and solved, and the only solution which the country can afford is the "right one." The industry stands condemned on its wartime performance. Even were it able to point to successful accomplishment in the pre-war years, it could not claim that an organization which falls down in the time of greatest need is a sound or healthy one. The blame has been variously attached to the colliery owners, and to their management; to the workmen, and to their leaders; even to the Government itself. Much mud has been slung, and this unhelpful pastime continues.

The solution will not be found in this manner, nor by a constant reiteration that the miner is in a sullen humour and that he will be content with no solution other than a political prescription which has been prepared for him. Nor will it be found through the too frequent wail about indiscipline, absenteeism and kindred follies on the part of the miner, which, unfortunately, is the sole contribution of some of our own members. No solution will be found through refusal on the part of diehard employers to accept that their private considerations are as naught against the background of the national need for a solution.

These are no solutions, and the inescapable facts remain. The country must have coal in adequate quantity, at a price which will not strangle its industries, and it must be freed from the fear that any day the supply may be cut off through lack of understanding in the mining industry; understanding between its constituent elements; and joint understanding of their several and collective responsibilities.

If others be blind, or choose to practise delf-deception, or to delude their fellows, the colliery manager must face the facts, and seek that solution which can only be attained through service—and he must pursue it in his proper sphere.

Trade and Process Tariffs*

By W. JOHNSON,
Wandsworth and District Gas Company

PROMOTIONAL tariffs are a comparatively recent development in the Gas Industry. Twenty-five years ago the average gas undertaking generally allowed a flat rate of discount for power, a relic of the days when industrial gas meant gas engines. The war of 1914–1918 brought gas into more common use in factories at a time when, for the most part, our Industry was not equipped to advise on the proper application of gas. The circumstances at that time led to the use of gas, often most inefficiently, because it saved labour. Cost of production did not matter, and many large loads were obtained at full price.

About 1921 the Industry began to experience the loss of the lighting and power loads in a marked degree. This led many undertakings to look into their consumption records, where they found that the big loads in factories were rapidly disappearing. The reason was soon forthcoming—gas was too expensive when compared with other fuels. "Tariffs for factories" was the remedy introduced in order to reduce the cost and thus maintain a disappearing load. I want to stress the fact that tariffs were not brought into being because a study of the costs showed that gas could be sold cheaper to factories, but were essentially a matter of expediency.

Some undertakings, it is true, began to see the importance of a proper survey, but they were handicapped from the start. A sound promotional tariff meant not only a severe loss in revenue, but there were few who could attempt to estimate the prospects of recovery. The opportunity given after the last war to bring in tariffs when the price of gas was high was generally missed. By 1922 gas prices were beginning to fall. It is to be hoped, therefore, that now the published price of gas has again reached a high level the opportunity for a bold tariff policy will not be missed.

The Report on Gas Charges made by Mr. G. Evetts to the National Gas Council was published in 1926, eight years after the war. In spite of the lapse of time I still think the division of costs into the four headings of Consumer Cost, Commodity Cost, Manufacturing Cost, and Distribution Demand Cost is fundamental and sound in conception, though changes have taken place which affect the proportion of these charges.

Two Distinct Tendencies

There appears to me to be two distinct tendencies in tariff policy:

1. *Trade and Process Tariffs.*

By this I mean tariffs designed to produce a price at which gas can be sold to a particular trade or process. Time of consumption and such factors, while affecting the possible price concession, are second considerations.

2. *Basic Tariffs.*

That is a tariff where gas is to be sold at the lowest price, only taking into account the amount consumed, the time of consumption, and any other factors which may affect the cost of service. This tariff takes no account of the purpose for which gas is required. Either of these two types can be in the form of a block rate tariff or a two-part tariff.

The basic theory behind the trade and process tariff is that gas has a variable value according to the process to which it is applied:

1. Industry can be divided into two classes:
   (*a*) Those in which heat is an essential part of the process—*e.g.*, metal melting, baking bread.
   (*b*) Factories where heat is a secondary process—*e.g.*, tailoring, wood working.

In the first group cost of fuel is a major item and hence price is a vital matter in choice of fuel. The second group will study convenience first and price second.

As far as we are concerned the first group offers to us big consumptions and unlimited development, and the second, smaller consumptions and a more restricted field for development.

2. The value of gas to the consumer can be affected by:
   (*a*) Efficiency in use.
   (*b*) Value of the finished product.

Industry decides the methods of manufacture and we have to design gas heating equipment to suit their methods. This means that we can design an appliance in one case with a very high thermal efficiency, while in another case we have to be satisfied with relatively low efficiencies. The value of the product can affect the value of gas because industrial concerns, quite rightly, work out the cost of fuel per article produced. If the product is a valuable one the cost of fuel, irrespective of its efficiency in use or its initial cost, may only be a small fraction of the total cost.

* Paper to the London and Southern District Junior Gas Association.

Application of Trade Tariffs

Some trades have common processes, for example: fish fryers, paint and varnish makers, bakers, sugar confectionery.

In such premises the equipment in each factory is the same in principle and differs only in size. The hours of demand, load factor, value of gas are equal within each trade. It is therefore possible not only to devise a tariff which is equitable in the trade, but enough is known about the value of gas to assess with accuracy at what price gas will need to be sold to get a fair share of the business. Some processes which are common to many industries can be treated by such means—*e.g.*, gas engines and steam boilers. The efficiency in use is comparable between similar appliances irrespective of size.

Competitive value is a known factor, hence a process tariff is practicable.

Unfortunately we have only dealt with a few uses. When we come to extend our survey the problem becomes complicated. Take heat treatment plant as an example. The processes involved are many, and vary in value and efficiency. They occur mixed up with other manufacturing processes. It soon becomes apparent that for the bulk of uses the policy of process or trade tariffs breaks down or becomes difficult. We may be driven to a general tariff which is, in type, a basic tariff.

Where trade or process tariffs have been employed, and the instances are many, they have been successful within the trade. One objection that has been made to them, when they take the form of a block rate scale of discounts, is that they create difficulties with consumers whose rate is not so favourable. The use of a two-part tariff based on the "installed load" is an alternative, and has the advantage that it conceals the difference in terms between varying processes. This tariff is, of course, essentially a process tariff.

It might be advisable to say what I mean by "installed load." Those undertakings which use this method assess the standing charge according to the type and size of equipment installed. For example, a standard heat treatment furnace, say, 3 ft. by 2 ft. by 2 ft., will have a definite standing charge. This is usually fixed by assuming a certain standard number of hours of use. From this and knowing the gas consumption, an estimate is made of the probable standard yearly consumption. You have then to decide what rate you wish to recover, and from this data calculate what must be the standing charge to yield this amount with a fixed commodity rate for gas. The effect, so far as the consumer is concerned, is that he receives a heavier rate of discount if the appliance is used for a longer period than the standard used for assessment. Conversely, intermittent or infrequent use increases the cost of gas. If the price for gas is low in relation to the recovered price, the variation in price can be rapid in both directions. It is therefore most essential that the commodity rate should not be fixed too low, otherwise the heavy user may get his gas at uneconomic rates.

Other difficulties which must be considered in this form of tariff are:

1. Increase in installed load, outside the gas undertaking's knowledge. This could be a real difficulty except that it is found in practice that the agreement is faithfully observed by the vast majority of factories.
2. Method of assessing the load—that is, whether it shall be based on the maximum rating or an estimation of the average hourly rate.
3. Estimation of small uses. Some of these could be ignored, but a limit must be set.
4. The consumer's reaction to installing extra appliances when it means an increase of the standing charge.

The answer to these points is the Process Tariff, designed to give equitable terms between similar processes. Hence, providing the calculation of the standing charge is the same for similar processes, the basic principle of the Process Tariff is satisfied.

Basic Tariff

This type of tariff demands for its compilation a study of the charges which go to make the total cost of gas in order to find out what concessions can be made for (*a*) quantity ; (*b*) even demand ; (*c*) off-peak loads.

To make the argument as clear as possible we will assume that the published price of gas is 12d. per therm and that this total can be divided as follows:

	d.
Consumer cost	3.0
Commodity cost	6.0
Manufacturing demand cost	1.3
Distribution demand cost	1.7
	12.0

This division is purely hypothetical, but it represents the order of these costs with sufficient accuracy for our purpose.

Consumer Cost

This charge covers those costs which are unaffected by the quantity of gas sold or the way in which it is taken. It is the cost of the service we maintain to meet the public need. If we take the average consumption per consumer per year as being about 200 therms, this charge represents a sum of £2 10s. per consumer per year. In these days the main item in this charge is Sales Development. Some undertakings give this as equal to 2d. per therm sold, which suggests that about two-thirds of the consumer cost is for the sales organization. When we consider industrial consumers only, this item is overcharged, since the cost of development is much less for industrial gas than for domestic sales. My own view on this charge is that I would rather see more money spent on development of industrial sales on such items as adequate salaries and an extended development service than credit factory consumers with a lower consumer cost.

In the compilation of any block rate tariff, this charge is best recovered by means of an initial block at full rate. Using our assumed costs the discount rate allowing only for consumer cost would be:

First 200 therms per annum	12d. per therm.
Over 200 „ „	9d. „

A two-part tariff would contain the sum of £2 10s. in the standing charge to recover consumer cost. This takes no account of the consumer who does not pay his share of the consumer cost. When the time comes to reduce prices I hope that it will be done by introducing tariffs for all consumers, leaving the standard rates at a high level. This should reduce the number of uneconomic consumers.

Commodity Cost

This charge covers those costs which depend only on the volume of gas sold. To sell gas below this price is definitely uneconomic, and irrespective of how or when the gas is taken, this is the minimum rate which can be permitted. Thus in the compilation of a block rate tariff the lowest block rate cannot be below this figure.

Our block rate now becomes:

First 200 therms per annum	12d. per therm.		
Next X „ „	9d. „		
„ Y „ „	6d. „		(above) and
	9d. „		(below)
Over Y „ „	6d. „		

The question whether gas can in any circumstances be sold at the bare commodity rate depends on what argument can be found to justify ignoring the manufacturing and distribution costs.

Manufacturing and Distribution Demand Costs

Our examination suggests that the discount range between 25% and 50% depends on the effect of the industrial load on the manufacturing and distribution demand cost. The factors which are likely to influence these charges are: Maximum hourly demand, variation in quarterly demand, off-peak or night loads, quantity.

(a) Maximum Hourly Demand.

We must consider the effect of this on the distribution system as a whole and not in part. A study of the hourly send-out shows a peak on Sunday between 12 noon and 2 p.m., which is double the send-out of the average morning and afternoon load. From this we conclude that the distribution system which can handle the Sunday cooking load is adequate to meet any industrial demand which occurs outside these hours.

Further, an examination of a number of factory consumptions shows that:

(i) There is practically no demand between 12 noon and 2 p.m. on Sunday.

(ii) In most factories the consumption falls between these hours on each weekday with a heavy fall at Saturday noon.

We can therefore state that factory consumptions are beneficial even in those factories where the canteen is the bigger load. The higher average hourly demand per industrial consumer also depresses the cost per therm chargeable to distribution demand. Thus we have two factors which enable us to state that factory users are entitled to receive a reduction in the distribution demand costs. Only one thing can upset this argument, and that is will the future development of industrial sales create new peaks of comparable importance with the Sunday peak load? It is my opinion that this is not possible unless the domestic cooking load is lost or much reduced in volume, and I just refuse to contemplate such a depressing future.

(b) Variation in Quarterly Demand.

These variations affect the item—Manufacturing Demand. If we could maintain an even load over the year the production department would be able to arrange a regular programme of production and maintenance throughout the year. This would be more economical in labour viewed from the average cost per therm over a full year. It would make for a more economical scheme of plant maintenance.

The industrial load in bulk is more regular in demand than the domestic consumer. In 1943 my Company's records show that the winter quarter was greater than the summer quarter by 26% for domestic uses and only 18% for factory consumers. These figure include a considerable amount of gas used for space heating.

Taking factories in groups we find that some factories, such as the food trades, give an almost constant winter and summer demand. My own Company's figures for 1943 for bakers were as follows:

1st quarter	.. .. ..	22,162 therms.
2nd „	.. .. ..	22,662 „
3rd „	.. .. ..	22,416 „
4th „	.. .. ..	23,715 „

Fish fryers and caterers show similar figures.

I consider that too much can be made of the value of even yearly demand. We are suppliers of heat, and it is foolish to imagine that we can ever obtain a balanced load winter and summer. To attempt to do so is to deny ourselves the bulk of the available market. The Gas Industry must be organized to cater for heavy winter loads, and credit for summer use by giving reduced rates to factories is a doubtful policy.

(c) Off-peak and Night Loads.

The usual meaning of "off-peak" loads is those loads which occur between the hours of 8 p.m. and 8 a.m. During these hours many gas undertakings can supply without boosting, so we have an immediate saving in distribution costs. Increased use in these hours also reduces the total cost per therm distributed because the mains continue to do work. Therefore loads which occur in off-peak hours are very beneficial, and it is suggested that they can be reasonably relieved from payment of distribution demand charges, except for such items as maintenance.

(d) Quantity.

Reduced price for quantity is a well established custom in all trades, including the Gas Industry. I have suggested that a consumer who burns above 200 therms per year is entitled to a reduction because he has paid his share of the consumer cost. The large industrial user does not always offer us advantage from the point of view of reduction of manufacturing demand charges, but he may from the viewpoint of distribution. The truth is that, though we may not in all cases be able to justify the concession, tradition compels us to reduce our price for quantity. We have therefore to make allowances for this by grading the amount we must recover into steps based on consumption.

Compilation of Basic Tariff

If you accept the above arguments we find:

1. That manufacturing demand cost is payable in full.
2. Industrial users are entitled to a reduction in distribution demand charges, and where there is an off-peak load—*i.e.*, baking—to be relieved from all charges except maintenance. Let us assume that this maintenance charge equals 0.5d. per them.
3. Discounts for quantity are obtained by loading the smaller consumptions.

Finally, a single basic tariff is not necessarily the fairest method of charge, and we have shown that time and method of use can be beneficial to the gas undertaking. Hence one tariff irrespective of use may be unfair to some users. My opinion is that some trade tariffs are essential, particularly in the food trades. For general factory consumption a single basic tariff is sound. I see no advantage and much danger in a basic two-part tariff.

Our basic tariff should therefore take a form as follows:

First Block.—200 therms per annum at 12d. per therm. This recovers consumer cost.

Second Block.—X therms per annum at 9d. per therm, consumer cost having been recovered. Gas costs cover commodity, manufacturing and distribution demand costs in full. This block is loaded with full distribution costs in order to create a lower rate for quantity.

Intermediate Blocks.—Manufacturing demand costs recovered in full, but distribution costs are progressively reduced. Price varies between 7.8d. and 9d. per therm.

Final Block.—Gas at 7.8d. per therm. This is made up of manufacturing and commodity costs plus 0.5d. per therm to cover maintenance of distribution plant and mains.

Conclusions

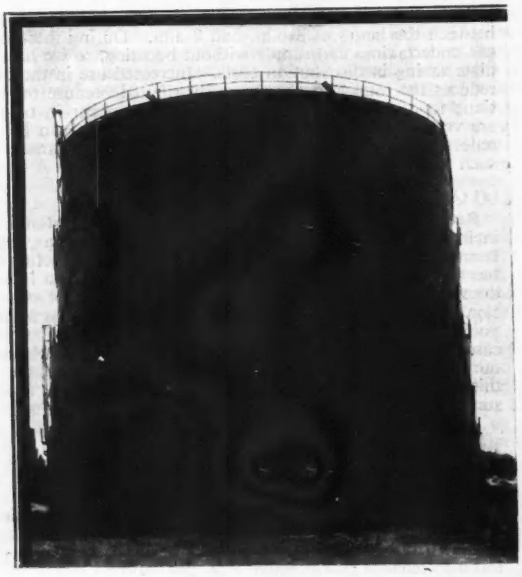
1. A sound tariff is one which is economic, no matter what the size of the individual load or the proportion of the industrial consumption to the total sales.
2. Generally speaking existing tariffs should be more favourable than they are to medium sized factories.
3. Some trade tariffs are essential.
4. We are presented with a great opportunity to produce a sound tariff policy.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

ADDITIONAL STORAGE CAPACITY

may *not* necessarily involve additional ground space.

If faced with this problem have you examined the possibilities of increasing your Holder capacity within the original tanks?



These Gasholders, with capacities of 336,217 and 147,100 cu. ft., replace two single-lift Holders of 95,000 and 50,000 cu. ft. respectively. Thus, the total storage capacity of these two units has been more than tripled without additional ground space, and utilising the existing tanks.

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The Gas Industry and the Plastics Industry

The following discussion took place on the Paper by Dr. W. E. de B. Diamond to The Institution of Gas Engineers—see last week's "JOURNAL"

Limitations and Possibilities

Mr. **Dean Chandler** (South Metropolitan Gas Company): Dr. Diamond refers to the use of gas for heating platens of hydraulic moulding presses. Perhaps it is not common knowledge that the use of gas for this purpose is well established, and in days to come, as the plastic industry develops and expands, there should be an increasing demand for gaseous fuel in that industry. It is noted that there is a possibility of using polyvinyl chloride sheet in place of meter leathers, and that this material is being tested by the Meters Committee of the Institution. We await with interest the findings of that Committee. I suppose it will also be suitable for diaphragms for governors, and although there are certain drawbacks, I should think it would be a very desirable material in the case of governor diaphragms.

Only brief reference is made by Dr. Diamond to the use of plastics for flexible gas tubing. I should like him to know that we are examining samples of tubes made of plastics as a substitute for rubber, and so far we are encouraged to believe that there is a future for them. Chemists have made, and I have no doubt will continue to make, progress in the improvement of plastic materials, and I believe that some of the properties which now restrict its use in domestic gas-heating appliances will be removed. For example, Dr. Diamond tells us that the material should not be used in its finished state at temperatures higher than 170°F. It is not quite clear whether this is the safe maximum temperature at which plastics may be used, and I should like to have more information on the point. I was under the impression that it was possible to produce plastics which would stand much higher temperatures.

We must thank Dr. Diamond for not failing to point out the present limitations to the use of plastics. In this connexion I would like to quote from Dr. E. F. Armstrong's Inaugural Address before the Royal Society of Arts in November, 1944, in which he said: "One of the problems is the general use of new materials, whether on a small or on a large scale. Such are generally introduced by ambitious and enthusiastic salesmen who promise too much and, in consequence, harm is done to the reputation of a good material when it fails to live up to conditions which should never have been expected of it."

Meter Construction

Mr. **T. J. Haynes** (Bournemouth): No one with a knowledge of plastics suggests that there is a plastic substitute for all and every material used in engineering construction, and the public is still in the dark as regards the progress which has been made during the war in the production of plastics with special qualities. It is therefore impossible at this stage to say in what way plastics can be used for any special purpose.

It has been suggested that I should deal with the possibilities of using plastics in gas meter construction, but I can think of several more likely possibilities—water heaters, radiators, flues for products of combustion, &c.—wherever appearance and resistance to moderate heat and moisture are desirable.

The meter industry is always on the look-out for alternatives to tinplate for meter case work. Any substitute must be of considerable tensile strength and be capable of rough handling without fracture. It should be easily moulded, and it must be possible to join sheets of the material together at the edges in order to make a gas-tight meter case strong enough to resist all attempts at fraud by unauthorized persons, and yet be easily dis-assembled to give access to the meter mechanism for repairs, &c. So far, no suitable alternative material from the plastic field has been found to satisfy these requirements. At the same time we must not lose sight of the possibility of altering the design of our meters and the methods of construction in order to make use of new materials, provided the result will be a meter much cheaper and more accurate and with a longer life than meters now in use. We cannot allow conservative ideas among either manufacturers or users to stand in the way of progress. We are accustomed to the idea that "there is nothing like leather," and so far meter manufacturers have had little success in finding a substitute which satisfies all requirements for meter diaphragms. We are not unhopeful, however, that the Gas Research Board will be able to make recommendations as a result of investigations now in hand. Some experiments by private parties on polyvinyl sheets seem to indicate that this material is not entirely satisfactory for meter diaphragms.

Considerable experiments are also being made to discover suitable materials produced by the plastics industry to overcome the difficulties and troubles for so long experienced with metal valves and other moving parts of a meter mechanism, and there is every prospect of satisfactory results in the not too distant future. I suggest, however, that the whole line of approach at the moment is wrong. As I see it, the plastics industry has produced certain materials for war purposes, and now comes along and says this material will be useful to our Industry for those purposes and other material should be useful for some other purpose. I suggest that is the wrong line of attack altogether. It is for the Gas Industry to specify its requirements, and then for the plastics industry to produce materials to these specifications.

Plastics are still in their infancy. Of themselves, they cannot provide the solution to all our problems, but they do open up new fields of investigation for active minds not too rigidly bound by existing practice. Then, I think, we shall make some progress.

Raw Materials from the Gas Industry

Dr. **N. Booth** (Gas Research Board): Dr. Diamond has provided, in a small compass, both a review of the plastics industry and an account of its actual and potential relationship to the Gas Industry. The latter Industry already provides many chemical materials from the products of carbonization, but if the chemical industry in this country develops at the expected rate in the next few years, much more material will be required. Raw materials similar to those required by the plastics industry may also be needed for solvents, disinfectants, explosives, and synthetic rubber. In considering the extent to which the Gas Industry may help to supply the required materials, I should like to refer particularly to two products of carbonization which are not at present separated and used for chemical purposes—*viz.*, ethylene and methane.

Ethylene is a suitable starting material for the manufacture of many substances, and Dr. Diamond has indicated its usefulness in the plastics industry. I should like to point out, however, that as an alternative to making styrene from acetylene and benzene, it can be made from ethylene and benzene. The reactions of ethylene are well known in the laboratory, but considerable engineering experience is required to apply them on a large scale. It is interesting to note, however, that in the U.S.A. processes for making 50 different chemicals from ethylene have been developed to the stage at which commercial scale manufacture could be undertaken, if market conditions were favourable.

In 1938 the total amount of ethylene present in the gas made by the gas and coke oven industries was over 325,000 tons, of which the Gas Industry made about half. The alternative source of ethylene in this country was by dehydrating alcohol made by the fermentation of imported molasses. If all the alcohol made in 1938 had been converted to ethylene, 106,000 tons, which is only two-thirds of the potential production of the Gas Industry, would have been produced. Consequently, if the technical and economic problems involved in separating ethylene can be overcome, it should find a ready market for the manufacture of synthetic materials and in replacing alcohol made by fermentation.

With regard to methane, the total amount present in the gas made by the Gas Industry in 1938 was about 1¼ million tons, and the coke oven industry produced an equal amount. Methane was formerly regarded as rather unreactive chemically, but modern methods of attack have shown how it can be converted into useful chemical products. I should mention, however, that much of the work on the treatment of methane has been carried out in other countries, using natural gas which may contain 10 or 15% of ethane. The significance of this can be seen when experimental work on the partial oxidation of methane, referred to by Dr. Diamond, is considered. Unless there is an appreciable amount of ethane present, the oxidation tends to go preferentially to oxides of carbon instead of to methyl alcohol and formaldehyde. The application of pressures, often up to 100 atmospheres or more, is helpful in directing the course of the reactions into the desired channels. This partial oxidation reaction has been so successfully developed in the U.S.A. that in 1941 between one-quarter and one-third of the total amount of methyl alcohol and formaldehyde used in that country was being produced from natural gas. Examination of this process is evidently desirable in this country. If it were successful, the 25,000 tons of formaldehyde Dr. Diamond has referred to as the 1942 requirements of the plastics industry might be made from about 1% of the methane produced by the Gas Industry.

There are, however, many other ways in which methane might be used; for example, laboratory experiments have shown that hydrocyanic acid, which is required among other things for the manufacture of methyl methacrylate resins, can be made from methane and ammonia. This reaction also merits further study by the Gas Industry. The treatment of methane by chlorine is being examined by the Gas Research Board, and treatment by nitric acid would give nitromethane, a substance unavailable in this country prior to the war, but of potential use in the manufacture of many substances.

In addition to examining the problems involved in utilizing methane and ethylene, it is clear that methods of separating ethylene and methane from coal gas should be studied. A variety of methods, such as adsorption, solvent extraction, or thermal diffusion, might be used; the last named particularly merits further examination. Liquefaction, however, shows the most promise at the moment, and the Gas Research Board are working on some of the problems involved. This is allied with the study of the possibilities of removing a proportion of the methane for storage in liquid form against peak load requirements.

It would clearly be impossible for the Gas Industry to make available for chemical purposes more than a proportion of the methane which it produces. Both on account of the reduced thermal yield of saleable gas per ton of coal and of the alteration to the combustion characteristics of the gas, it would not be desirable to remove more than a proportion of the methane made at any one gas undertaking, although it might be possible to remove all the ethylene. If it were possible to remove as much as one-third of the methane without altering the combustion characteristics too far, and all the ethylene, the thermal yield per ton of coal would be reduced by about 22%, and the calorific value per cubic foot of gas sold by about 14%.

Further, it would not be economic to operate a separation plant if the supply of gas was below a certain figure, which in the case of separation by liquefaction may be about 1,000 million cu.ft. per annum. However, 70% of the gas sold is by undertakings selling more than this quantity, so that the Gas Industry may in the future be able to make a valuable contribution to the requirements of the plastics industry by supplying ethylene and methane for further treatment.

Example of Collaboration

Mr. **R. F. Hayman** (Gas Light and Coke Company): The Author mentions the use of polyvinyl chloride as a valuable material of possible use to the Gas Industry. Here is a typical example of collaboration between two industries. The Gas Industry can produce, and is producing, the plant to enable polyvinyl chloride coated material to be made. The Gas Light and Coke Company at the moment is also developing large-scale horizontal black emitter radiant heating panels for curing polyvinyl chloride coated fabrics. This material only requires radiant heating for periods from 20 seconds to 2 minutes —depending on the thickness of coat and the weight of the fabric— at panel temperatures of 600°–650°F., and the process lends itself admirably to continuous production.

To meet post-war demands for waterproof curtains, furnishing materials, and equipment such as wallets and haversacks, a wide variety of thicknesses of material in colours ranging between the two extremes, white and black, will be required, and we have successfully demonstrated that radiant heating by gas has the great advantage that material of all colours can be cured, with little difference in production time. This is important because, if a white material takes two or three times as long to cure as a black material, production time is upset and mixed colours cannot be treated together.

During the war, synthetic resin finishes have been used with success in cases where normal paints were unsuitable for technical reasons. Very little mention is made of such finishes in the Paper, and I should be glad to know of possibilities in this direction, with particular reference to heat transformable paints, further development of which may lead to even shorter drying times when the painted surface is exposed to heat. If such advances are made, the plastics industry can rest assured that the Gas Industry will not lag behind in producing suitable equipment for treating these materials.

Mr. **G. Dougall** (Gas Light and Coke Company): I feel that we must have much more enquiry into the most suitable resins for use in the Gas Industry. I call to mind the case of heavily loaded slow-moving bearings on hot coke conveyors, where the use of bearings made from synthetic resins is very helpful. They can be water lubricated, and they have a life very much longer than anything else we have tried. We do not yet know, however, whether we are using the proper bearings. We have merely found by trial and error something what is useful to us, and much more work is called for by the plastics industry in conjunction with the Gas Industry really to put these matters on a proper footing.

Advantages of Gaseous Heating

Mr. **Alex. H. Pinkess**: We have already had warnings about the misuse of plastics, and we must temper the natural enthusiasm for a new material with a knowledge of its characteristic properties. There has been a suggestion that plastic sheets might be used for the roofs of retort houses instead of glass, but I am afraid that the rate of deposition of clouding of the plastic material will be very much faster even than it is with glass.

Reference has been made to the use of polyvinyl chloride and similar materials for diaphragms. I cannot attempt to anticipate the findings of the Meters Committee; I have no personal knowledge of the work they are doing, but I have made some experiments in the use of these materials in governor diaphragms, and while I agree they are bound to be useful, it will be necessary to modify the designs to suit the properties of the material. In the diaphragms used in governors and meters, the forces available are very small indeed and the flexure required is very great, and a very much larger area of clean material will be required when compared with leather.

To take the other side, the use of gas in the plastics industry, I think a useful and expanding load will be found. There are many advantages The commonest form of heating for compression is steam; steam requires a boiler, a boiler requires coal, coal produces ashes and so on, and if we can build units with burners which will operate without further attention, it will be a great advantage. You avoid the large capital cost of the boiler and the labour charges involved. There is also the point that mouldings of various types require different temperatures, and with gas it should be easy to provide the variations of temperature in a way which is not entirely satisfactory when using steam heating. Also, with regard to pre-heating before the material is stressed, this is a very useful field.

Plastic Tubing and Fittings

Mr. **R. J. Pepper** (Gas Light and Coke Company): I would like to ask Dr. Diamond if there is any possibility of plastic tubing and fittings being produced in this country in the future. It has been found that some form of composition flooring, plasters, and certain cements have a corrosive action on iron and steel gas tubing, which has to be specially protected when we carcase buildings and houses. If suitable plastic tubing and fittings were available that would withstand this corrosive action, it would considerably facilitate carcasing many post-war buildings, and more than justify the comparatively high cost of wrought iron or other tubing. There is a possibility of composition flooring, especially of the magnesite type, being increasingly used in post-war houses owing to shortage of timber, and we on the utilization side shall be faced with considerable difficulties, because if we use iron tubing and it is not thoroughly protected, corrosion will take place. We sometimes protect by painting, but if we can protect by the use of plastics it will be a considerable advantage. Often corrosion takes place years after the pipes are laid, and I have a case at present where corrosion has taken place 15 years afterwards and gas escape has taken place through a composite floor. Therefore, with a suitable plastic tubing we could carcase buildings and be sure that we should not have these effects in post-war building operations.

Mr. **Walter T. Dunn**: I should like to raise the question whether plastic material could be applied in some form or other to direct-reading indices for gas meters.

Dr. **Diamond**: With regard to plastic bearings which Mr. Dougall mentioned, the material which is now being used is satisfactory. It is being used in a great number of industries for this type of application—*viz.*, heavy slow moving bearings which can be lubricated with water—and it is particularly useful in a corrosive atmosphere. As regards plastic tubes, mentioned by Mr. Pepper, tubes and fittings of polyvinyl chloride have been made in America and have been used in Germany. I hope this material will be available in due course in this country. Whether such tubes can be produced at an economic price for replacement of iron tubes after 15 years' service is another matter. There is, however, a possible alternative: the skirting boards may be moulded quite successfully to allow for pipes and services to be encased behind them. I was particularly interested in Dr. Booth's remarks concerning the possible development of the chemical side of the Gas Industry to provide raw materials for the plastics industry, and the whole plastics industry will look forward to hearing further from the Gas Research Board.

Manchester Juniors

A recent visit of the Manchester and District Junior Gas Association to the Rochdale Gas-Works proved an occasion for a record attendance. After inspecting the works and being entertained at tea, the visitors received a welcome from Councillor Walter Rhodes, Chairman of the Gas Committee. The President of the Association, Mr. D. Benson, of Bolton, expressed appreciation of the welcome, and said that such visits were rightly regarded as an essential part of the education of gas engineers. It was a great pleasure to him personally to be at Rochdale because, together with Mr. W. P. Smith, the Deputy Engineer, and Mr. H. Partington, the Distribution Superintendent, he had received his early training under Mr. C. H. Bamber, Rochdale's Gas Engineer and Manager, whom he congratulated upon his election as President of the Manchester and District Association of Gas Engineers.

Mr. J. A. Speers, President-Elect of the Junior Association, proposed a vote of thanks to the Rochdale Gas Committee and to their Chairman, and this was seconded by Mr. E. B. Field (Blackburn).

Mr. C. H. Bamber, in responding, said that it was actually the fourth occasion since the last war that the Association had visited Rochdale. Undoubtedly, from the instructional point of view, a visit of the Junior Association was likely to be more beneficial to its members than a visit of the Senior body. Technical men were, of course, vital members of the staff of a gas undertaking.

The following recently issued British Standard Specification may be obtained on application to the Secretary, Institution of Gas Engineers, 1, Grosvenor Place, S.W. 1:—B.S. 864 : 1945.—Capillary Fittings and Compression Fittings of Copper or Copper Alloy for use with Light Gauge Copper Tube, price 2s. net, post free.

The Institution of Chemical Engineers, the Institute of Physics, and the Chemical Engineering Group of the Society of Chemical Industry announce that the one-day Joint Conference on "Instruments for the Automatic Controlling and Recording of Chemical and other Processes," which was postponed in September last, will take place at the Royal Institution, London, on Oct. 19. The purpose of the Conference is to promote the interchange of knowledge and experience between physicists and chemical engineers. It will be open to all interested without charge, whether members of the organizing bodies or not.

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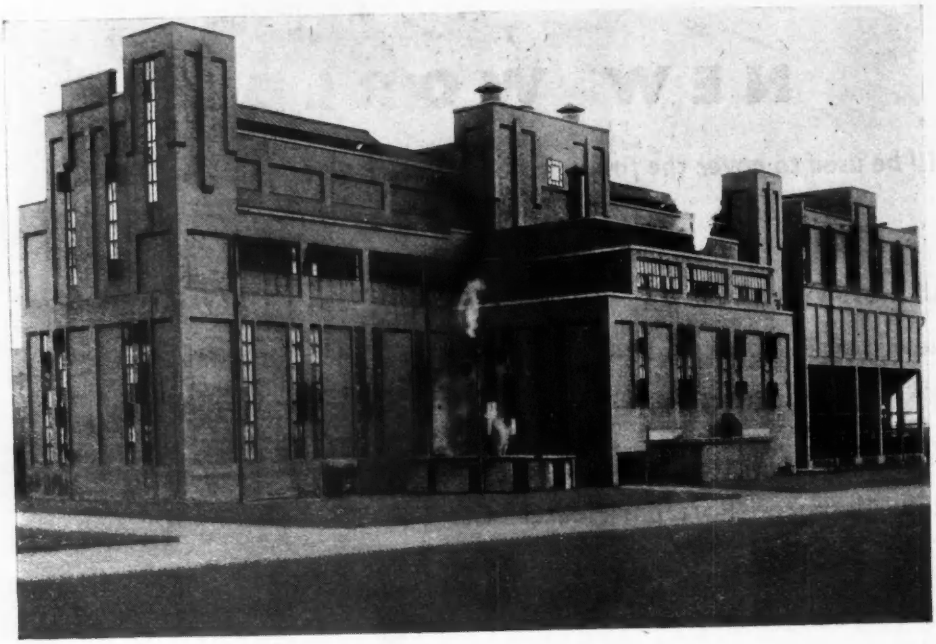

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American and British Coalmining Conditions

In an informative letter to *The Times* of Aug. 9 Mr. H. S. Haslam, Managing Director of the Dalton Main Collieries, Ltd., who has just returned from a comprehensive tour of coal mines in the United States, points out that no direct comparison can be made between coalmining conditions in America and in Great Britain.

Mr. Haslam, in the course of his letter, explains among other things that nearly all the coal mined in the States is wrought from seams with few faults, which lie at uniform gradients no greater than one in twenty. This favours the locomotive system of haulage. In England seams without faults are few and gradients from horizonal to vertical are encountered, often with local undulations all favouring, or even necessitating, the use of endless rope or main and tail haulage. Their average depth of working is what we regard as very shallow. Shafts rarely exceed 400 ft. in depth, and the majority of mines are served by slopes or drifts, not shafts. In this country nearly all the coal is hoisted through shafts from seams varying in depth from 1,200 ft. to 2,800 ft., while some of our coal comes from 4,000 ft. below the surface.

In British mines shaft-hoisting, ventilation, and underground haulage account for a high percentage of the power used and produced at collieries, utilizing low-grade fuels. In America colliery power is generally purchased from a public utility authority, but the amount required is considerably less owing to shallow workings in approximately level seams. Considerable man-power is absorbed in British mines in operating colliery power plants. Again, the coal reserves in America are vaster than in this country, and even at their present high rate of consumption, coal may be mined for a much longer period than in Britain. The percentage of extraction of seams in America is sometimes as low as 55% of the worked section of seam, and rarely over 90%, whereas we only depart from 98% to 100% extraction in few and particular circumstances.

The majority of American coal comes from seams which have no dirt bands, hence screening and washing plants, when installed, absorb much less manpower than in Britain, where nearly every colliery has extensive equipment. Coal market requirements and conditions are apparently easier in America than in Britain.

The thicknesses of the seams worked in America are greater in general than in England. Except in certain areas they rarely work seams under 3 ft. thick, and thicknesses of 6 ft. to 8 ft. are common, whereas in England there are few seams worked over 6 ft. in thickness, and many of under 3 ft.

The American workman has world-wide reputation for his desire to perform a full and fair day's work for the relatively high wages he receives, and the American miner is no exception. Hours of work per day are longer than in Britain, and the locomotive system of coal haulage enables the men to be transported quickly to and from their working places. The employer has the right to "hire and fire."

Vocational Training and Welfare

Vocational education, observed Mr. D. W. Davison, Assistant Engineer and Manager to the Inverness Gas Department, in a recent Paper to the Scottish Junior Gas Association (Eastern District), is likely to prove a knotty problem on the cessation of hostilities, as many who left as apprentices will return expecting to receive a man's wage for only a youth's grasp of their profession or trade. While Government grants may look after their financial needs, these will not make craftsmen of them. It would seem that some form of intensive refresher training on a national basis is called for. The Author continued:

"You are all aware of the excellent training facilities provided at Watson House for gasfitters and distribution personnel of the Gas Light and Coke Company. I would strongly suggest the setting-up of say two or three similar institutions in England and one in Scotland to which all returning Service personnel would be sent. This would have the advantage of establishing the distribution departments of practically all undertakings on really up-to-date lines and of getting rid of many of the handed-down methods at present employed. And what of apprentice professional gas engineers? Wherever possible I suggest that they should spend half their time at practical work and half on theory, so that they would quickly catch up with the latter side of their education. After all, undertakings have managed without their juniors for over five years of war, and a further six months or so should be possible. Nothing can take the place of practical experience, however, and these young men are really unfortunate in having lost so many valuable years. However, if they are keen and observant, and have the necessary fund of common sense, there is no question of their being able to expand and develop the Industry.

"I would also like to mention Welfare and all that it implies. To my mind we shall have to pay far more attention to this important aspect of management. You are all aware of the provisions of the 1937 Factories Act, providing as they do for adequate washing facilities, clothing accommodation, &c. How many gas-works measure up to these requirements? The Act has not been rigidly enforced during the war, but will probably be put into operation shortly to give these minimum requirements—and rightly so. Under Welfare one should include recreation and provision for the development of the team spirit. This feature, except in very large company-owned undertakings, has seldom been tackled. It is not enough to present a trophy for golf or bowls competition—something much more lasting must be done, such as the appointment of a personnel manager or welfare supervisor. While the appointment of an expert in this sphere may only be advisable or necessary in the larger works, it is feasible in the smaller undertakings for some employee with a liking for this work to be relieved of part of his normal duties to undertake welfare."

Display Kitchens

The two Kitchens and house plans displayed by Radiation Ltd. at their headquarters in Birmingham and at 7, Stratford Place, London, have proved centres of interest to a very large number of visitors from home and overseas, including representatives of Government Ministries and of local authorities, architects, builders, and others concerned with post-war house planning. The tangible evidence, in the design and arrangement of the dispays, of the service that the Gas Industry is in a position to offer and ready to give in the great reconstruction programme before the country has already been commented on favourably by many sections of the Press as an outstanding example of the balanced utilization of gas and coke to provide the essential requirements for heating, cooking, and hot-water supply. A feature which is proving of particular interest to architects is the incorporation in the construction of a common duct for flues and waste and supply pipes, so arranged as to be readily accessible for attention.

Diary

Sept. 6.—Solid Smokeless Fuels Federation: Executive Committee, Gas Industry House, 11 a.m.
Sept. 6.—Industrial Gas Centres Committee: Gas Industry House, 10 a.m.
Sept. 7.—North British Association of Gas Managers: Annual Meeting, Glasgow.
Sept. 10.—Women's Gas Council, Executive Committee: Gas Industry House, 12.45 p.m., to be followed by visit to Watson House.
Sept. 11.—British Gas Council: Gas Industry House, 2.30 p.m.
Sept. 11.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.
Sept. 13.—National Federation of Gas Coke Associations: National Technical Committee, Gas Industry House, 2.30 p.m.
Sept. 13.—Solid Smokeless Fuels Federation: Technical Committee, Gas Industry House, 10.30 a.m.
Sept. 17.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m., Gas Industry House.
Oct. 17.—Eastern Counties Gas Engineers' and Managers' Association: Autumn Meeting, Grosvenor House, Park Lane, W. 1.

Dividends

Croydon.—For the half-year to June 30, payable on Sept. 1, at the following rates per annum: Preference stock, 4%; Maximum Dividend stock, 5%; Sliding Scale stock, 6%.

Newcastle.—The Directors of the Newcastle-upon-Tyne and Gateshead Gas Company have declared interim dividends of 2% on the Preference stock and 2½% on the Ordinary stock, payable on Aug. 9. These are the same rates as last year.

Tottenham.—Interim on Ordinary stock 2½% actual, less income tax, on account of the year ending Dec. 31, 1945. Interim on 5% Preference stock 2½% actual, less income tax, on account of the year ending Dec. 31, 1945. Interim on 5½% Preference stock, 2¾% actual, less income tax on account of the year ending Dec. 31, 1945. Payable on Aug. 20.

Watford and St. Albans.—Interim dividend at the rate of £2½% on the Ordinary Stock (same) and full interim dividends on the Preference Stocks (all less income tax).

In the Sixth of the second series of technical discussions arranged by the Association of British Chemical Manufacturers on the efficient use of fuel and power in chemical processes the subject was "The Simultaneous Generation of Power and Process Steam." This Paper was presented and discussions were held in both London and Manchester. The discussions have been welcomed as making a considerable contribution to the exchange of useful information in this field.

The Codes of Practice Committee of the Ministry of Works has now issued for comment two further Codes belonging to the series on Gas Installations, of which six have already been issued. The new Codes are: No. 3, 4231, Gas Lighting (Single Family Dwellings)—CP(B) 479; No. 3, 4236, Flues for Gas Appliances—CP(B) 480. Copies may be obtained from the British Standards Institution, 28, Victoria Street, S.W. 1 (price 2s. each). A further Code, No. 3, 4232, "Hot Water Supply by Gas," will be published at the end of this month.

GAS PRODUCTS PRICES—STOCKS AND SHARES

The London Market Aug. 13.

The prices of Coal Tar Products are unchanged.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the maximum price of Pitch for briquetting has been increased to 60s. per ton f.o.r. supplying works, and the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S. R. & O. No. 1528, have been increased by one half-penny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

The only change to report in connexion with the prices of Coal Tar Products is the coming into effect on June 11 of a new Government Order increasing the prices of Coal Tar Spirits. This Order is entitled the Control of Benzole and Coal Spirit Order, 1945 (S. R. & O. 1945, No. 681).

Control of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944, No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Aug. 13.

The average prices of gas-works products during the week were : Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6½d., pure, 3s. 2¼d. (now controlled by S. R. & O. 1945, No. 681), operative from June 11, 1945. Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1945, dated June 1, 1945, S. R. & O. 1945, No. 681, operative from June 11, 1945. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene now controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Aug. 11.

Deliveries are less steady, but market is undisturbed meantime. Refined tar*: Yield to Distillers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7½d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 10d., and 90/190 Heavy naphtha, Unrectified, 2s. 0½d.; Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

There was a revival of confidence at the opening last week, and this became stronger as the week progressed. Consols 2½% were a special feature and a number of other gilt-edged securities hardened.

The Gas Market was fairly well supported, and with the exception of the marking down of some stocks which had not suffered with the rest a week ago it will be seen that in this section there were also a few recoveries. Gas Light units closed 9d. higher on Thursday, Imperial Continental gained 12½ points and Oriental 7, while several other ordinaries were marked up.

The following is the full list of price changes which took place last week :

OFFICIAL LIST

Bournemouth max.	158—163	—2
British Ord.	120—125	—10
Commercial Ord.	60—65	+1
Gas Light Units	21/—22/-	+-/9d.
Ditto 4 p.c. Pref.	100—103	—1
Ditto 3¾ p.c. Red. Pref.	100—103	—1
Ditto 3 p.c. Deb.	88—91	—1
Ditto 5 p.c. Red. Deb.	106—109	—1
Ditto 4½ p.c. Red. Deb.	106—109	—1
Imperial Continental	110—115	+12½

OFFICIAL LIST—*continued.*

Liverpool Ord. (*x.d.*)	123—128	Aug. 7
Mid-Southern Utility 4 p.c. Pref.	100—105	—3
Oriental	177—182	+7
South Metropolitan Ord.	87—92	+2
Tottenham Ord. (*x.d.*)	115—120	Aug. 7
Ditto 5 p.c. Pref. (*x.d.*)	110—115	"
United Kingdom Gas Corporation Ord.	22/—23/-	—1/-
Wandsworth Cons.	115—120	+2
Watford & St. Albans Ord.	115—120	+2

PROVINCIAL EXCHANGES

Bristol max.	118—120	—1¼
Newcastle Ord. (*x.d.*)	25/—26/-	Aug. 7
Ditto 4 p.c. Pref. (*x.d.*)	102—104	"
Sheffield Cons.	150—152	—2

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TULLY SONS & CO. LTD.
Millgate, Newark-on-Trent. T/N Newark 258. T/A Tullcarbo Newark.
The PATENT Mechanically Operated
TULLY GAS PLANT
with Waste Heat Boiler for the
ONE STAGE GASIFICATION OF COAL

TOM CARRINGTON & CO. LTD.
Lyndon Toolworks, West Bromwich. T/N 0517 (2 lines).
"LYNDON" and "EGA-KUT"
SCREWING TOOLS;
TAPS; DIES; STOCKS AND DIES;
GROUND THREAD TAPS

MAIN
Gas Cookers, Fires, Radiators, etc.
Large-Scale Cooking Equipment
R. & A. MAIN, LTD.
LONDON AND FALKIRK

A. H. WILKES & COMPANY.
(Proprietors Wm. Allday & Co. Ltd.)
Head Office: 38a, Paradise Street, Birmingham 1.
Manufacturers of a wide range of specialized industrial gas appliances. "WILKES" soldering and brazing equipment. Blowers, Burners, Fans, Furnaces, for many specialized duties. Enquiries invited.

HILMOR LTD.
Tube Bending Machines (Hand and Power). Tube Bending Specialists.
65, Calshot Street, King's Cross, London, N. 1. 'Phone: Terminus 4714 (2 lines).
We can supply machines for bending Gas and Steam Piping from ¾ in. to 2 in. in the cold state.

Pegson Screens, Rammers and Rippers willingly stand aside in this issue that all advertisers may be fairly served.
PEGSON LTD., Coalville, Leics.

IRISH BOG ORE

Porous and Light
Easy to Work

A War Time Economy of Labour

HARRISONS (LONDON) LTD.
66, MARK LANE, LONDON, E.C. 3

Telegrams: "BIRCHROCK, LONDON." Telephone: ROYal 3120

TROTTER, HAINES & CORBETT LIMITED
FIRE-CLAY & BRICKWORKS
STOURBRIDGE

GAS RETORTS in BEST STOURBRIDGE QUALITY also SILICIOUS QUALITY 81% SILICA

HIGH GRADE INSULATING QUALITY FIREBRICKS

REGENERATIVE TUBES & TILES

"KLEENOFF"

—THE COOKER CLEANER

Tins for Sale to Consumers. In Bulk for Works Use

OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.

Telephone: Mansion House 1156. Telegrams: "Balefire, London."

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—Weir Feed Pump, 8½ in. by 6 in. by 13 in.; Spencer Hopwood Boiler, 10 ft. by 4 ft. 3 in., 90 lb.; Sectional Steel Tank, 16 ft. by 16 ft. by 4 ft.; Steel Tank, 26 ft. by 10 ft. by 8 ft.; Weir Service Pump, 7 in. by 7½ in. by 18 in.; 30 h.p. H.S. Enclosed Steam Engine; 10 h.p. Steam Turbine.
HARRY H. GARDAM & CO., LTD., STAINES.

FOR SALE.—Two GAS SCRUBBERS by Blair, Campbell & McClean, Ltd., Glasgow. 8 in. dia. by 23 ft. 7 in. high, made up of 1 base section with drive, 6 scrubbing sections, with a total of nine baffle plates, vertical shaft with nine distribution. 24 in. inlet and 24 in. outlet, 5 in. liquor outlet, complete with seal pot, sight glass and receiver.
NELSONS SILK, LTD., Caton Road, Lancaster.

COUNTY BOROUGH OF STOCKPORT
(GAS DEPARTMENT)
FOR SALE

ONE MERCURY BULB D.C. RECTIFIER AND TRANSFORMER, capacity 70 amps. 460 volts from 400 volts, 3 phase A.C., complete with D.C. instruments.
ONE 20 h.p. D.C. MOTOR, 460 volts, 650 r.p.m., by Lancashire Dynamo & Crypto Ltd., complete with controller, resistance and spare armature.
ONE RATEAU 3-STAGE TURBO EXHAUSTER by Bryan Donkin, capacity 200,000 cu.ft. per hour against 36 in. w.g. at 3,900 r.p.m. coupled to Steam Turbine by Greenwood & Batley, developing 40-50 h.p. at 100-120 lb. per square inch, complete with hydraulic regulator, shaft governor, throttle valves and stop valve.
All particulars and facilities for inspection can be obtained from T. Reynolds, M.Inst.Gas E., County Borough of Stockport, Gas-Works, Portwood, Stockport.
Sealed tenders marked "Tenders for Sale of Plant" should be addressed to the Chairman of the Gas Committee, Town Hall, Stockport, and be received not later than 9 a.m. on Friday, August 31, 1945.
The Corporation does not bind itself to accept any tender.
ARTHUR BOND,
August 3, 1945. Town Clerk.

FOR SALE.—9,000 cubic feet per hour wet drum type Station Meter fitted with new drum 1935; excellent condition. No valves or connexions. Available in 4-5 months. May be inspected and offers sent to J. C. Cotterill, Engineer and Manager, Gas-Works, West Bridge, St. Austell.

WE are interested in obtaining a FLOWMETER capable of registering up to 100 cu.ft. of air per hour. Reply to No. 9457, "GAS JOURNAL," 51, High Street, Esher, Surrey.

PLANT WANTED

WANTED.—3 cu.ft. TEST GASHOLDER. Good condition. No. 9458, "GAS JOURNAL," 51, High Street, Esher, Surrey.

FOR SALE.—Six Ewarts "Advance" WATER HEATERS No. 3A discontinued (2 repaired) lying Wallasey Gas Department. Offers to Barry, 37, Victoria Street, Liverpool.

CONTRACTS OPEN

COUNTY BOROUGH OF STOCKPORT
(GAS DEPARTMENT)

TENDERS are invited for the Supply of One 2-ton Long Wheelbase LORRY, to be primed only
Sealed tenders in plain envelopes endorsed "Tender for Austin Lorry" should be delivered not later than Tuesday, August 21, 1945, addressed to the Chairman of the Gas Committee, Town Hall, Stockport. The Corporation does not bind itself to accept the lowest or any tender.
Town Hall, ARTHUR BOND,
Stockport. Town Clerk.

COMPANY NOTICES

THE BARNET DISTRICT GAS AND WATER COMPANY

NOTICE IS HEREBY GIVEN that the TRANSFER BOOKS of this Company relating to Ordinary and Preference Stock WILL BE CLOSED on the 18th August, 1945, and REOPENED on the 1st September, 1945.
Offices: Station Road, By Order of the Board,
New Barnet, Herts. E. D. DAVEY,
August 9, 1945. Secretary.

EDUCATIONAL

ARTHUR DUCKHAM RESEARCH AWARD

APPLICATIONS before September 8, 1945, are invited for the Arthur Duckham Research Award for 1945-46, namely a FELLOWSHIP of the value of up to £500 for the purpose of an investigation of certain physico-chemical aspects of combustion.
Applicants should not be more than 35 years of age and should possess an Honours Degree of a British University, preference being given to those having experience in the Gas Industry.
Conditions from the Honorary Secretary, Arthur Duckham Memorial Fund Committee, 1, Grosvenor Place, London, S.W. 1.
August 8, 1945.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

URGENTLY REQUIRED. — ENGINEERING DRAUGHTSMEN, mechanical and structural. FITTERS, PLATERS, PLATERS' HELPERS, and STEELWORK ERECTORS. Apply to Messrs. W. J. Jenkins & Co., Ltd., Beehive Works, Retford, Notts.

SENIOR DRAUGHTSMAN required, experienced in design of Carbonizing Plant and Structural Work, also capable of taking out quantities and preparing specifications.
Reply, stating Age, Experience and Salary required, to F. C. Sugden & Co., Ltd., 10, East Parade, Leeds, 1.

CITY OF LINCOLN GAS DEPARTMENT

APPLICATIONS are invited for the position of CHIEF WORKS SUPERINTENDENT, maximum daily make 5 million cu.ft.
Must have thorough knowledge of W.D. Vertical Retorts, modern plant and methods. Good experience in control of men and first-class organizing ability necessary.
Commencing Salary £425 per annum to £500, plus house, coal and gas, plus War Bonus, subject to Superannuation deductions.
Successful applicant will be required to pass medical examination.
Applications, stating Experience, etc., together with *copies* of three recent Testimonials on or before Monday, August 27, to be addressed to:
Silver Street, GEO. WRIGHT, M.I.M.E.,
Lincoln. M.I.G.E.,
August 8, 1945. City Gas Engineer and Manager.

FITTINGS SUPERINTENDENT required. Small house available at low rental.
Apply, stating Age, Qualifications and Salary required, to G. P. MITCHELL, Managing Director, Worcester New Gas Light Company.
July 25, 1945.

TECHNICAL ASSISTANT required, having experi- ence in the manufacture (Verticals) and distribution of Gas. Commencing Salary £340.
Apply, stating Age, Experience, etc., to G. P. MITCHELL, Managing Director, Worcester New Gas Light Company.

REQUIRED.—MAINTENANCE FITTER with Gas- Works experience, preferably with horizontal plants on small works. Single man preferred, able to drive. Apply: Severn Valley Gas Corporation, Gas-Works, Cheltenham.

EXECUTIVE OFFICER and SECRETARY required for the Scottish Office of the British Gas Council Applicants must be capable organizers with initiative and capacity for administration. Salary £550 per annum plus War Bonus at present £60 per annum. Applications should be addressed to The Secretary, National Gas Organizations in Scotland, 48, West George Street, Glasgow, C. 2, from whom details of duties and conditions of appointment may be obtained.

GAS MANAGER AND COLLECTOR

APPLICATIONS are invited for the combined office of GAS MANAGER AND COLLECTOR for Stevenston Gas Company Limited, Stevenston, Ayrshire. Make about 90 millions, 2,000 consumers, Salary £450 with free house and fuel.
Applications, stating Age and Qualifications, should be lodged with the Secretaries, Jas. Campbell & Co., Bank of Scotland Buildings, Stevenston and Saltcoats, on or before September 5, 1945.

PONTYPOOL GAS AND WATER COMPANY

APPLICATIONS are invited for the appointment of ASSISTANT ENGINEER to General Manager of the above Undertakings, the present output being:
650 million cu.ft. of gas per annum.
400 million gallons of water per annum.
Conditions of appointment and salary may be obtained from the undersigned.
General Offices, J. POWDRILL,
Clarence Street, General Manager.
Pontypool, Mon.

HALESOWEN GAS COMPANY

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT. Candidates should have practical experience in the operation of Gas-Works Plant, particularly with respect to Horizontal Retorts, Benzole Extraction and C.W.G., and in Gas-Works Chemistry. Commencing Salary £300 per year.
Applications, with full details of Qualifications and *copies* of Testimonials, are desired by September 10, 1945.
Gas-Works, J. H. WAINWRIGHT,
Halesowen, Engineer, Manager and
Worcestershire. Secretary.

The Ministry of Labour and National Service have given permission under the Control of Engagements Order, 1945, for the advertising of this vacancy.

ASSISTANT GAS ENGINEER required. Applicant should possess the Higher Grade Certificate of The Institution of Gas Engineers in Manufacture (and Supply would be an advantage). Must be experienced in all matters concerning Gas Manufacture and Distribution, have a good knowledge of Chemistry, and be able to control men. Ability to prepare specifications and supervise new work is essential. The salary offered is £500 per annum, inclusive of War Bonus. A medical examination may be required for superannuation purposes. Application should be accompanied by *copies* of three recent Testimonials, and should be addressed to the Managing Director, Lowestoft Water and Gas Company, and received not later than August 27.
165, High Street,
Lowestoft.

SKIPTON URBAN DISTRICT COUNCIL
APPOINTMENT OF GAS ENGINEER AND MANAGER

APPLICATIONS are invited for the above appoint- ment at a salary of £500 per annum, rising by annual increments of £25 to £600 per annum, plus cost-of-living bonus.
The tenancy of a house owned by the Council will be offered to the successful candidate.
The carbonizing plant consists of modern machine-charged horizontal retorts, and applicants should have a thorough working and theoretical knowledge of plant of this character, together with adequate commercial and distribution experience.
The appointment will be subject to three months' notice on either side, and to the provisions of the Local Government Superannuation Act, 1937. The person appointed will be required to pass a medical examination.
All fees, emoluments and payments received from or by virtue of this appointment, or any other offices to which he may be appointed by or with the consent of the Council, shall be paid by him into the Council's account.
Applications, stating Age, Qualifications and full record of Experience, and giving the names, status and addresses of three referees, must reach this office not later than first post on Thursday, August 30.
No application form will be issued.
Canvassing, directly or indirectly, will disqualify.
Town Hall, K. B. ROBINSON,
Skipton, Acting Clerk of the Council.
Yorks.
August 10, 1945.

(Classified Advertisements continued on p. 242)

APPOINTMENTS VACANT
(continued)

WELL established firm of Tar Distillers and Benzole Refiners require Assistant Works Manager, with full knowledge of distillation and refining of Tar and Benzole products. State in confidence, Age, Experience, Qualifications and Salary required to No. 9456, "GAS JOURNAL," 51, High Street, Esher, Surrey.

PORTSMOUTH AND GOSPORT GAS COMPANY

GENERAL MANAGER

THE Directors of the Portsmouth and Gosport Gas Company invite applications for the position of GENERAL MANAGER (vacant through the death of Mr. Thomas Carmichael).

Testimonials are not required in the first instance, but applicants should state their Age, Qualifications, Experience, present position and salary expected.

Letters, marked "Private," to be sent, by September 8, 1945, to the Chairman, Portsmouth and Gosport Gas Company, Chief Offices, The Square, Portsmouth.

CHELTENHAM AND DISTRICT GAS COMPANY

APPLICATIONS are invited for the Position of HOME SERVICE ADVISER and COOKERY DEMONSTRATOR to take charge of and reorganize the Home Service Department of the above Undertaking.

Applicants should possess the necessary experience and qualifications for a post of this nature, and applications, which should be received not later than the first post on August 27, should be in writing addressed to the undersigned, quoting the salary required and the name of three Referees.

Central Office, North Street, Cheltenham.
A. L. MORRIS, General Manager.

THE WATFORD AND ST. ALBANS GAS COMPANY

ASSISTANT INDUSTRIAL GAS ENGINEER

APPLICATIONS are invited for the Position of ASSISTANT INDUSTRIAL GAS ENGINEER at a commencing salary of £400 per annum, inclusive of war bonus.

Applicants should not be more than 35 years of age, and have a good technical knowledge and practical experience of the application of town's gas for industrial and commercial purposes.

Applications, stating Age, Qualifications and Experience together with *copies* of two recent Testimonials and position in relation to Essential Works (General Provisions) Order should reach the undersigned not later than August 25.

The Watford and St. Albans Gas Company, Clarendon Road, Watford.
T. C. BATTERSBY, General Manager and Chief Engineer.

BRIXHAM GAS AND ELECTRICITY COMPANY

APPLICATIONS are invited for the Position of GAS-WORKS SUPERINTENDENT. Applicants should possess a sound mechanical training and the ability to carry out routine chemical and physical testing. Experience with Woodall Duckham Vertical Retorts, Carburetted Water Gas and Activated Carbon Benzole Recovery Plants an advantage.

Possession of The Institution of Gas Engineers' Higher Grade Gas Engineering (Manufacture) Certificates preferable, but not essential.

Salary £300 per annum, plus war bonus, plus gas, electricity, and coke at half price.

Applications, giving details of Age, Training, and Experience, and stating position under the Essential Work Order, together with *copies* of two recent Testimonials, to be sent to the Engineer and General Manager, Brixham Gas and Electricity Company, Brixham, Devon.

COUNTY BOROUGH OF WARRINGTON

APPOINTMENT OF GAS ENGINEER AND MANAGER

THE Council of the County Borough of Warrington invite applications from suitably qualified persons for the post of ENGINEER AND MANAGER of the Gas Undertaking at an annual salary of £1,100, rising subject to satisfactory service by annual increments of £50 to a maximum of £1,250 plus cost of living bonus at the current rate for the time being (at present £59 16s. per annum), plus such car allowance as the Council may determine. Particulars and conditions of appointment and duties may be obtained from the undersigned.

No printed form of application is being used. Applications, stating Age, Qualifications, present and previous appointments (with dates and salaries), and giving full particulars of Experience, together with *copies* of three recent Testimonials, must be sent to the undersigned endorsed "Gas Engineer and Manager" so as to be received not later than 12 noon on August 24, 1945.

Canvassing will disqualify, and candidates when making applications must disclose in writing whether to their knowledge they are related to any member of the Council or any co-opted member of a Committee, or any officer of the Council. Failure to do so will disqualify or may lead to dismissal without notice.

The Ministry of Labour and National Service have indicated that the Control of Engagements Order, 1945, does not apply to this vacancy.

Warrington, August 3, 1945.
W. E. E. LOCKLEY, Town Clerk.

BOROUGH OF ILKESTON

APPLICATIONS are invited for the permanent Position of TECHNICAL ASSISTANT to the above Undertaking at a commencing salary of £250, rising in increments of £15 to £320 per annum, in accordance with Grade "E" of the Council's Grading Scheme, plus cost of living bonus.

Candidates should have experience in the operation of Gas-Works plant, particularly W.-D. Vertical Retorts, and should also have experience in Practical Gas-Works Chemistry.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, marked "Technical Assistant," stating position under National Service Acts and Essential Works (General Provisions) Order, and giving full particulars of Age, Training, Experience, and Qualifications, with *copies* of three recent Testimonials, to be received by the undersigned not later than Tuesday, August 28, 1945.

Canvassing, directly or indirectly, will disqualify.

Town Hall, Ilkeston. August 13, 1945.
E. I. E. WILLIAMS, Town Clerk.

DERBY GAS LIGHT AND COKE COMPANY

ASSISTANT INDUSTRIAL SUPERINTENDENT

APPLICATIONS are invited from competent Combustion Engineers for the Position of ASSISTANT INDUSTRIAL SUPERINTENDENT.

Applicants must be of good education, and be familiar with the general applications of heat for industrial processes; be able to design burner equipment and general layouts for non-standard gas applications, and be capable of preparing working drawings. Selling experience and ability to recognize potential industrial gas development is essential.

The applicant should hold the Higher Certificate in Gas Engineering (Supply) of The Institution of Gas Engineers, or have equivalent combustion engineering qualifications, and should have a sound practical training in either Metallurgy or Mechanical Engineering.

The commencing remuneration will be not less than £400 per annum.

Applications, stating Age, Qualifications and Experience, together with the names of two persons from whom references can be obtained, also information as to the candidate's position in relation to the Essential Works (General Provisions) Order and Military Service, should be addressed to the undersigned.

Friar Gate, Derby.
C. H. MOSEDALE, Secretary.

BOROUGH OF NEWARK-ON-TRENT

APPOINTMENT OF GAS ENGINEER AND MANAGER

APPLICATIONS are invited for the above appoint- ment at a commencing Salary of £650 per annum, rising by annual increments of £25 to a maximum of £800 plus cost of living bonus, at present £59 16s. per annum.

Candidates must be Corporate Members of The Institution of Gas Engineers and must have had practical experience in the control of a Gas Undertaking. Experience in the recovery of by-products, Gas distribution, and the development of gas sales on modern lines is essential. House available.

Candidates must not be over 45 years of age.

The appointment, which will be subject to the provisions of the Local Government Superannuation Act, 1937, and the passing of a medical examination, will be determinable by three months' notice on either side.

Applications, stating Age, Qualifications and Experience, and as to the position under the National Service Acts and the Registration of Employments Order, accompanied by *copies* of three recent testimonials, and endorsed "Gas Engineer and Manager," must reach the undersigned not later than September 7, 1945.

Canvassing members of the Council is prohibited and will disqualify.

Town Clerk's Office, Newark-on-Trent. August 8, 1945.
H. TALLENTS, Town Clerk.

COUNTY BOROUGH OF SOUTHPORT

APPOINTMENT OF GAS ENGINEER AND MANAGER

THE Council invite applications for the appoint- ment of GAS ENGINEER AND MANAGER, at a commencing salary of £1,000 per annum, rising by annual increments of £50 to a maximum of £1,250 per annum, plus the appropriate cost of living bonus. In a suitable case the selected applicant may be appointed at a salary in excess of the commencing salary.

Applicants must be duly qualified Engineers, possessing technical, administrative and commercial qualifications. The person appointed must devote the whole of his time to the duties of the office.

The appointment will be determinable by either side on three months' notice, and will be subject to the provisions of the Local Government Superannuation Act, 1937. The selected candidate will be required to pass a medical examination.

Applications, stating Age, Qualifications, present appointment and duties, and full details of experience, accompanied by *copies* of not more than three recent Testimonials, must be delivered to the undersigned in a sealed envelope endorsed "Gas Engineer and Manager" not later than August 31, 1945.

Canvassing directly or indirectly will disqualify a candidate.

Town Hall, Southport. August 8, 1945.
R. EDGAR PERRINS, Town Clerk.

STROUD GAS LIGHT AND COKE COMPANY

APPLICATIONS are invited for the position of GENERAL WORKS FOREMAN at a wage of £7 per week inclusive of War Bonus.

Carbonizing Plant consists of Horizontal Machine Charged Retorts.

Profit sharing and Superannuation Scheme in operation. Successful applicant will be required to pass a medical examination.

Applications to be received by the undersigned on or before September 3, 1945.

F. B. WALLER, Engineer and Manager.

WELLS GAS LIGHT COMPANY

APPLICATIONS are invited for Position of Assis- tant Engineer and Manager to the above Company, at a Salary of £300 per annum with House, Gas, and Coal free.

Candidates must be qualified Gas Engineers, and have a thorough knowledge and experience of control and maintenance of Gas-Works Plant, and also capable of drawing up specifications and preparing Plans for extensions or alterations; experience in distribution will be considered an advantage.

Applications, stating Age, Experience and Qualifications, together with *copies* of three recent testimonials, must reach the undersigned not later than August 23, 1945.

Gas Offices, Wells, Somerset.
CLARENCE DUNN, Engineer, Secretary and Manager.

COUNTY BOROUGH OF MIDDLESBROUGH

(CORPORATION GAS DEPARTMENT)

APPOINTMENT OF CHIEF CHEMIST AND TECHNICAL ASSISTANT

APPLICATIONS are invited for the appointment of CHIEF CHEMIST AND TECHNICAL ASSISTANT.

The Salary will be £440 per annum, plus cost-of-living bonus, which is at present £59 16s. per annum, rising by annual increments of £20 to £500 per annum.

Applicants must have sound experience of the chemical control of a large Undertaking, and have practical experience of modern gas manufacture and Water Gas Plant.

The appointment will be subject to the Corporation's regulations governing conditions of service, and to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, giving full details of Age, Training, Qualifications, and Experience, stating position under the Essential Works Order and in regard to military service, together with three recent Testimonials, must be delivered to the undersigned not later than Monday, August 27, 1945.

Corporation Gas-Works, Commercial Street, Middlesbrough.
JOHN W. PALLISTER, M.Inst.C.E., M.Inst.Gas E., A.M.I.Struct.E.

COUNTY BOROUGH OF WARRINGTON GAS DEPARTMENT

TEMPORARY TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of TEMPORARY TECHNICAL ASSISTANT to assist the Distribution Superintendent of the Gas Undertaking.

Applicants must have had considerable experience on the Distribution side of a large gas undertaking, and experience should include main laying, service work, street lighting installations, industrial development and stove and meter repair shop control.

The Salary will be £350 per annum plus cost of living bonus, at the current rate, for the time being (at present £59 16s. per annum).

Applications, stating Age, Qualifications, Training and Experience, accompanied by *copies* of not more than two recent Testimonials, should be sent to the undersigned, endorsed "Technical Assistant," so as to be received not later than first post on August 24, 1945.

Canvassing will disqualify, and candidates, when making application, must disclose in writing whether to their knowledge they are related to any Member of the Council or any co-opted member of the Committee or any Officer of the Council. Failure to do so may disqualify or lead to dismissal without notice.

The Ministry of Labour and National Service have given permission, under the Control of Engagements Order, 1945, for the advertisement of this vacancy A9(C).

Gas Department, Mersey Street, Warrington. August 7, 1945.
JOHN E. WAKEFORD, Gas Engineer and Manager.

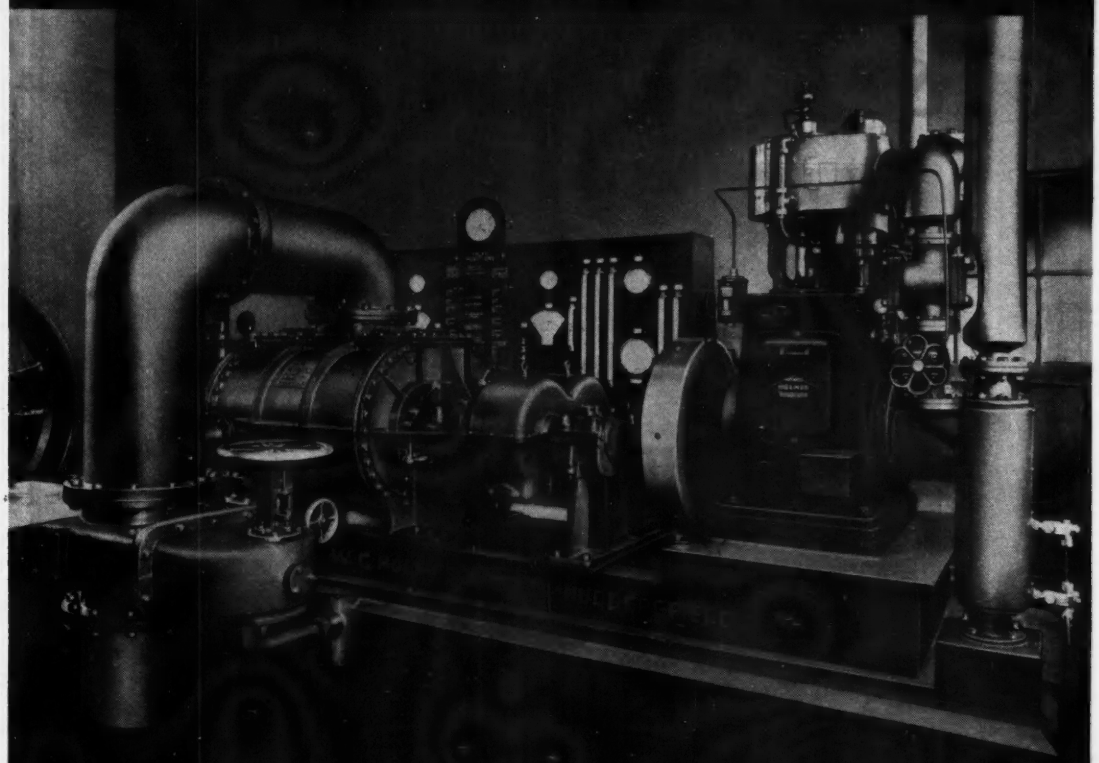
REPAIR WORK

CLOCKWORK Controllers for Public Lighting Control and Time Switches, Clocks and all type of instruments and appliances operated by Clockwork Repaired, Overhauled and Guaranteed. Inquiries welcomed. J. W. & R. E. Hughes (Clockwork Engineers), 58, Victoria Street, London, S.W. 1. ('Phone Victoria 0134.)

GAS STREET LIGHTING

COMPLETE overhaul of Gas Controllers, includ- ing cleaning, adjusting, timing, mainsprings, balance staffs, gas cocks, repainting cases. Serial numbers recorded. Large or small quantities. Maintenance contracts undertaken. Estimates free on application to George F. H. Hutchinson, M.B.H.I., Horological Instrument Repairer, "Windy Lea," 36, Lee Lane, Horsforth, near Leeds. 'Phone 2167.

HOLMES · CONNERSVILLE



EXHAUSTERS

The illustration shows a Holmes-Connersville Exhauster installed at a Northern Gas Works—capacity 6 million cubic feet of gas per day.

FOUNDED 1850 HOLMES HUDDERSFIELD

Holmes-Connersville Exhausters give long and dependable service and require only a minimum of attention.

HEAD OFFICE • TURNBRIDGE • HUDDERSFIELD

LONDON OFFICE · 119 VICTORIA ST. S.W.1 · MIDLANDS OFFICE 21 BENNETTS HILL BIRMINGHAM 2

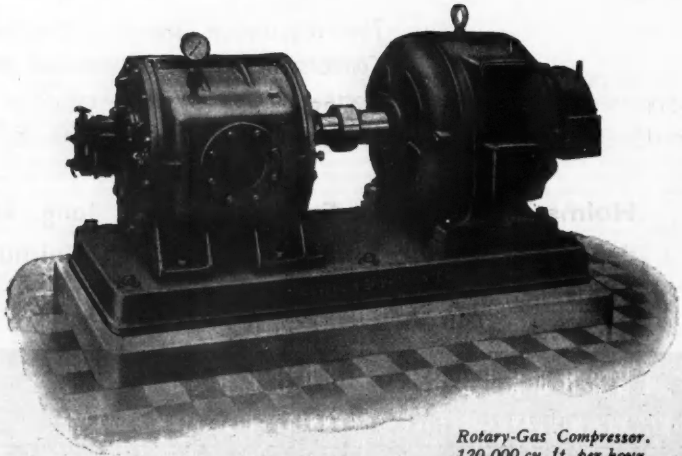
Telephones: Huddersfield, 5280 : LONDON, Victoria, 9971 : BIRMINGHAM, Midland, 6830

C230

GAS BOOSTERS & COMPRESSORS.

Illustrated above are two Turbo Boosters with capacities of 2,000,000 cubic feet of gas per hour each. They are direct-coupled to Steam Turbines.

We have supplied numbers of Steam Turbine and Motor Driven Exhausters for Coke Oven Plants; Steam Turbine, Motor and Gas Engine Driven Gas Boosters and Rotary Compressors for Transmission and Distribution Purposes; Portable Compressor Units for Breaking up Roadways with Pneumatic Picks for Laying Gas Mains, and for Caulking and testing Pipe Lines; and Turbo Blowers for Water Gas Plants. If you send us particulars of your requirements we will quote you for suitable plant.



Rotary-Gas Compressor. 120,000 cu. ft. per hour.

Write to Dept. "J" for illustrated pamphlets, giving full particulars of our manufactures.

REAVELL & Co., Ltd., IPSWICH.

Telegrams: "REAVELL, IPSWICH."
Telephone: 2124 & 2125 IPSWICH

DEVELOPMENTS
in Parkerizing and Bonderizing
ARE SIGNIFICANT

Pyrene Metal Surface Treatment Processes made their initial appearance in the nineteen-twenties when Parkerizing was introduced. Since then the following significant advancements have been made:—

1931 "BONDERIZING" for Paint Anchorage.

1935 "PYLUMINIZING" for the protection of Aluminium.

1936 "SPRA-BONDERIZING" for Paint Anchorage by conveyorized and mechanically-controlled production methods.

1937 "D" Process for "PARKERIZING" and "BONDERIZING" of Iron and Steel, also for treatment of Zinc and Cadmium surfaces or mixtures of these with ferrous metal assemblies.

1938 "PYROGRIP" Cold cement for dressing mops and bobs used for scurfing and polishing.

1939 "PARKERIZING" for Lubrication.

1942 "BONDERITE" 'K' for treatment of continuous steel strip and sheet production.

Other war developments which have taken place are, at present, available only to Government Factories and Contractors.

IT CANNOT BE PARKERIZED (Registered) OR BONDERIZED (Registered)

WITHOUT Pyrene CHEMICALS

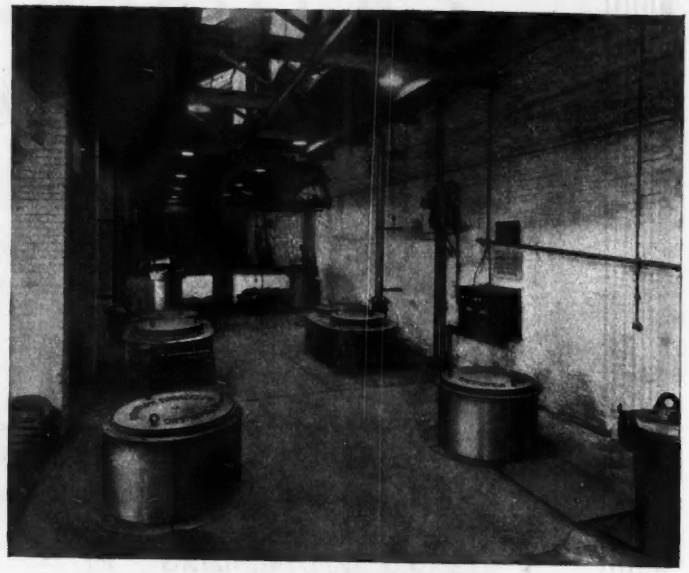
The Pyrene Company Limited • Metal Finishing Division • Great West Road, Brentford, Middx.

WIRE ANNEALING

THE illustration indicates a typical lay-out of two units of pot ty pe anreal ing furnaces as supplied to a number of important Wire Manufacturers.

Each unit comprises preheat and heating chambers followed by a cooling chamber.

Units can be supplied to suit requirements with regard to pot size and capacity, but usual charge is 10 cwt. per pot.



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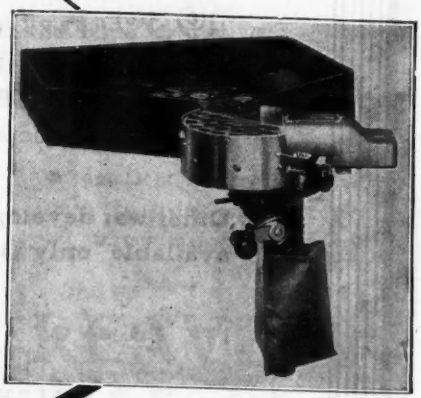
THIS MACHINE COUNTS FOR YOU!

How can any business which deals daily with large numbers of coins do without a counting machine? Is it fair to your business or your employees to rely on the human element when thousands of coins must be counted daily? Could not that human element be better employed doing other and more important work?

Many Gas Companies and the Wages Departments of hundreds of firms depend entirely on the service these machines can give. They are, in the first place, absolutely accurate . . . they stop automatically on £5 worth of silver and 5/- worth of copper . . . and they count at the rate of a 1,000 coins per minute.

All over the world these counting machines are proving their worth.



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Fair-sized towns can reduce their lighting costs hundreds of pounds yearly by fitting

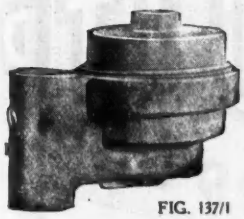

FIG. 137/1

Peebles STREET LAMP GOVERNORS

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On right: Straight pattern Soldering Iron for light work, with pointed square copper bit.

Straight pattern Soldering Iron complete with tube equipment.

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HIGH-PRESSURE GAS SOLDERING IRONS

One "Keith" Soldering Iron replaces two or more soldering bolts because it is heated internally, and continuous work is possible with no delays occasioned through re-heating in a stove.

WHERE the use of "Keith" Soldering Irons is not convenient the "Keith" Twin Soldering Stoves will be found the most economical means of heating ordinary copper soldering bolts.

Here is a "Keith" Twin Soldering Stove for high or low pressure gas, complete with injector, burner and cast-iron tray.

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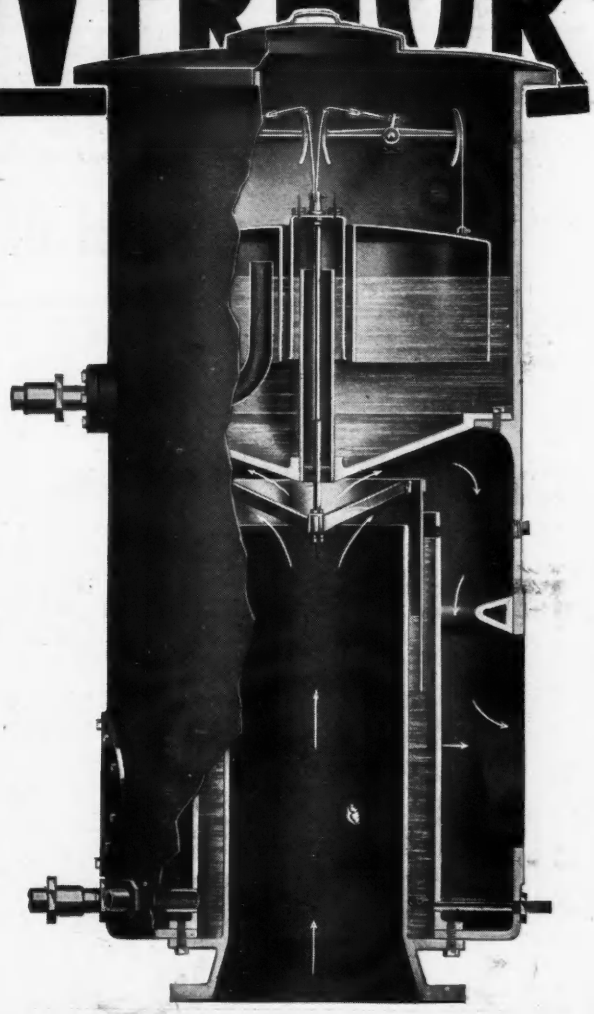
Printed by Straker Brothers, Ltd., London, E.C.2, for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C.4.—Wednesday, August 15, 1945.

B·K VACUUM GOVERNOR

Patent No. 395,443

BETTER CONTROL OF CALORIFIC VALUE AND CONDITIONS IN RETORTS WITH REDUCTION IN MAINTENANCE COSTS



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FOR ALL KINDS OF METERS

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1. Test on the shelf by winding them for 3 turns and observing if they run over tappets. If so wind fully. Number of turns then required is number of days controller should run between winds.

2. Oil gas cocks generously with Newbridge Gas cock Oil — but don't dismantle plug if you can possibly avoid it.

3. Never oil any part of the Clock movement. This is an expert's job and harm may easily result.

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